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ADENOMA UTERI.[1]

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In a former paper on "Malignant Disease of the Corporeal Endometrium" (*N. Y. Medical Record*, April 5, 1890) I referred at some length to "malignant adenoma," which I then regarded as an extremely rare condition. Subsequent study and clinical observation have convinced me that it is probably less infrequent than I formerly supposed, although it often escapes recognition in what may be designated as the pre-malignant stage of the disease. So much confusion exists in the nomenclature of diseased conditions of the endometrium that I am sure that you will pardon me for selecting such an apparently technical theme if I succeed in placing the subject in a clearer light. I have chosen the general title "Adenoma Uteri" in order to call attention to the errors that have crept into the writings of some of the most careful pelvic pathologists through their including under this head a number of different conditions, ranging from simple hyperplasia of the endometrium to adeno-carcinoma. For example, Fürst[2] described three varieties of adenoma, viz.: *adenoma uteri simplex*, or simple glandular hyperplasia; *adenoma uteri suspectum*, or destructive glandular hyperplasia; and *adeno-carcinoma*, or typical glandular proliferation with epithelial infiltration and general destruction of the tissues. As the latest authority on gynecology (Pozzi) properly remarks, the application

[1] Read by title before the Obstetrical Section of the Amer. Med. Assoc., May 6, 1891.
[2] Zeitschr. für Geburtsh. u. Gyn., 1887, Bd. xiv. Heft 2, p. 364.

of the term "benignant adenoma" to simple glandular hyperplasia has been made by those who look at the subject almost entirely from an anatomical standpoint, and arbitrarily group together conditions which present similar histological appearances, without due regard for their clinical differences. The importance of this will be evident later when we discuss the question of the possible relation between endometritis fungosa and cancer of the corpus uteri. Still more confusion has been caused by the numerous references in the literature to "polypoid adenoma" (Muckel), "channelled polypus (de Sinéty), etc., terms which are applied to simple mucous polypi or even to endometritis polyposa. Winckel, usually so lucid, is by no means clear on this subject, but seems to favor Klob's bewildering pathological division. Even such a forcible writer as John Williams might lead the incautious reader astray by causing him to infer that such polypi tend to become cancerous;[1] though he specifies the cervical variety, other writers are not so careful. It is by no means certain that the specimen described by him was a true case of cancerous degeneration; and if it was, the development of epithelioma in the mucosa covering the surface of a so-called "glandular polypus" is a very different process from the transition of a true adenoma to carcinoma. Of course I refer always to intra-uterine, not to cervical, growths.

In the case of a mucous membrane which is so peculiarly the seat of localized and diffuse hypertrophies and pseudo-neoplasms as that which lines the uterine cavity, one must invariably apply the crucial test before deciding the question of the benignancy or malignancy of a certain growth. Is it confined to the mucosa in which it originated, or does it invade the deeper tissues? This it is often impossible to determine from an examination of curettings. Great injustice is done to pathologists in this respect. They are expected to decide positively regarding the character of an intra-uterine growth, when they receive only a few superficial fragments. Sometimes a lock of the patient's hair would be about as useful. No reliable microscopist would hazard a positive opinion in a doubtful case, unless he receives portions of the growth with the subjacent tissue; these can only be obtained by the use of the sharp curette. Reference will be made to this subject again under the head of diagnosis.

Briefly, then, I may state that I do not admit the existence of a distinct variety of intra-uterine neoplasm to which can be applied the term "benignant" as distinguished from "malignant" adenoma. I recognize only one variety—the adenoma malignum of Schröder, or diffuse papillary adenoma of Winckel, which I wish to show is anatomically the incipient stage of adeno-carcinoma; that as regards their clinical symp-

[1] "Cancer of the Uterus." Harveian Lectures for 1886; London, 1888, p. 75.

toms they are practically identical, but that there is an important difference between the two as regards prognosis.

HISTORICAL.—Matthews Duncan is credited by Williams with having been the first to describe adenoma of the body of the uterus.[1] From his graphic description of the clinical symptoms, as well as from Slavjansky's careful report on the microscopical examination of the specimen removed, this would seem to have been rather a case of true adeno-carcinoma—the final, rather than the initial, stage of the disease. Duncan himself, with his characteristic acumen, concludes: "I can entertain very little doubt that, whether the disease is as yet truly malignant or not, it will before many months are passed, show the terrible characters of undoubted cancer." We read that recurrence took place almost immediately, the patient dying five months after he first saw her. In the light of our present knowledge few would have hesitated to perform a radical operation, instead of the palliative one which simply hastened the fatal issue.

The next contribution to our knowledge of this class of neoplasms was made by Breisky and Eppinger,[2] who report and figure a most instructive case, in which the former thoroughly curetted a uterus for recurring hemorrhage, removing a number of cauliflower masses, which presented the typical structure of adenoma. The hemorrhage reappeared, and four months later a second curetting yielded a fresh quantity of material, which was softer and more friable than that which had been removed on the previous occasion, and on microscopical examination indicated clearly the transition of the adenoma to adeno-carcinoma, the cross-sections of glands showing their lamina choked with epithelioid cells that presented a marked contrast to the cylindrical epithelium with which the tubes were lined. There was also an invasion of the deeper tissues by the neoplasm, which had not been noted before.

Klebs in discussing this paper credits Ackermann with reporting the first case of adenoma uteri, but it appears that the growth was confined to the portio vaginalis.

Schröder[3] showed that he clearly recognized the condition, though he leaned toward the theory that there existed transitional forms between endometritis fungosa and what he denominated "malignant adenoma;" the latter, he noted, frequently developed into true glandular carcinoma. J. Veit[4] soon after described and figured a case which showed the transition from adenoma to carcinoma.

Winckel describes and figures a museum specimen of diffuse papillary

[1] Edinburgh Med. Journ., vol. xix. p. 92.
[2] Prager med. Wochenschrift, Bd. ii., 1877, p. 78.
[3] Krankheiten der weiblichen Geschlechtsorgane, 1879, p. 261.
[4] Zeitschr. f. Geburtsh. u. Gyn., vol. i., 1877, p. 189.

adenoma, without clinical history, and the writer of the monograph on Non-malignant Tumors of the Uterus in the *American System of Gynecology* reproduces the figure, but in the context fails to recognize clearly that it is a true neoplasm, not a mere hyperplasia of the endometrium.

Mann[1] should be credited with having recognized this condition, as he examined and described a post-mortem specimen.

Bartolet[2] had a similar case in which the diagnosis of papillary adenoma was made during life from an examination of curettings.

Thomas'[3] supposed cases are open to serious doubt. The very fact that one patient recovered after the curette had been used fourteen (!) times in five years, and that the other was curetted at frequent intervals during seven years, would at once exclude them from the present category. Moreover, only the curettings were submitted to microscopical examination.

Of Goodell's[4] three cases of "villous degeneration of the endometrium," the second was probably ordinary endometritis fungosa; the first and third, from their clinical history, probably illustrated the transition from adenoma to adeno-carcinoma, as in my third case. Unfortunately, in neither of the instances was an opportunity afforded of examining the growth *in situ*.

Ruge and Veit[5] were the first to make a careful study of adenoma, and Ruge presented a communication on this subject to the German Gynecological Society in 1888. Fürst alludes to it incidentally in the paper already quoted. My own more recent observations were reported in my paper of last year, to which reference has been made. I there mentioned two specimens which I had examined (Dr. Wylie's and Dr. Bache Emmet's), to which are now added two of my own. Dr. Freeborn, Pathologist to the Cancer Hospital, tells me that he has seen a fifth. In all of these the entire uterus was removed.

The most recent communication on this subject is by E. W. Cushing[6] who clearly describes and figures the condition in question, recognizing its malignant character, as shown by its recurrence and eventual transition to the true carcinoma.

Beyond these I know of only five authentic specimens of papillary adenoma, described by any of the writers before mentioned, excluding all cases in which the diagnosis was founded upon the clinical history and the microscopical examination of scrapings alone. There may be

[1] Amer. Journ. of Obstetrics, January, 1878, p. 113.
[2] Philada. Med. Times, April, 1878, p. 354.
[3] Diseases of Women, 5th ed., 1880, p. 570.
[4] Lessons in Gynecology, 3d ed., 1887, p. 317.
[5] Zeitschr. für Geburtsh. u. Gyn., Bd. vi., 1881, p. 302.
[6] Annals of Gynecology and Pædiatry, May, 1891, p. 458.

others, but if so, they have been reported in such an imperfect way as to render them unreliable from a scientific standpoint.

In presenting these three uteri, removed by myself during the past year at the New York Cancer Hospital, I would call attention to the fact that they form a sort of ascending series. Case I. may be regarded as a typical specimen of circumscribed malignant adenoma, Case II. a beautiful example of the diffuse form of the same neoplasm, and Case III. illustrates the final stage of the disease—transition to adeno-carcinoma. As the histories have already been published, I shall present them merely in abstract for the sake of comparison.

Case I.—The patient was a single woman, fifty years of age, who had reached the climacteric seven years before. She had had slight atypical hemorrhages for five years before I saw her, and had been curetted twice during the previous year with only temporary benefit. The scrapings had not been examined microscopically. Diagnosis, probable sarcoma. She entered my service at the Cancer Hospital in December, 1889, being then in good general health.

She had severe paroxysmal pain in the pelvis, which recurred every day at regular intervals, but had no vaginal discharge whatever.

Tissue removed by the curette was examined microscopically but without positive results. I could only decide that the condition was neither endometritis fungosa nor round-celled sarcoma, and hence was led to believe that I had to do with cancer of the corporeal endometrium, although the long duration of the symptoms and the remarkably good condition of the patient were against this theory.

The uterus was extirpated *per vaginam* with considerable difficulty, though not large, because of the contracted vagina and outlet. Forcipressure was used. The patient made a good recovery and is now in perfect health, with no signs of recurrence. The anatomical condition is circumscribed papillary adenoma, neither does the microscope reveal any trace of transition to carcinoma. Yet the growth had begun to infiltrate the muscular layer, and the clinical symptoms, though of long standing, pointed unquestionably to its inherent malignancy. There is no doubt that a delay of a few months, with one or two more palliative operations, would have resulted fatally.

Case II.—Widow, aged fifty-three years. One child and three miscarriages. Menopause reached three years ago, soon after which she began to have an irregular sanguineous discharge from the vagina with occasional hemorrhages. She said that she had a "polypus" removed six months before, after which the flow ceased for a time, but soon returned. No pain whatever until a few weeks before her admission to the Cancer Hospital in November, 1890. Was in robust health. Examination showed the uterus to be moderately enlarged, freely movable, and insensitive to pressure; the endometrium bled easily. Fragments of tissue removed with the curette were too superficial to allow of a positive diagnosis, except that the growth was probably malignant. Total extirpation of the uterus *per vaginam*, with forcipressure. Normal convalescence, and patient discharged cured at the end of five weeks.

The specimen is a beautiful example of diffuse adenoma of the corpus

uteri, which has just begun to infiltrate the deeper layer, but exhibits no histological evidence of cancerous change. The prognosis for a permanent cure, as in the former case, is excellent, although too short a time has elapsed since the operation to make the case valuable from a statistical standpoint.

CASE III.—Widow, aged sixty-three years. On entering the hospital she stated that she had passed the climacteric many years before, and had always enjoyed good health until seven months before, when she began to have a slight "show" at rare intervals, and her health commenced to decline without apparent cause. She had had no pain except severe backache for a few weeks. Slight inodorous watery discharge from the vagina. The os was dilated with tents, and the uterine cavity was thoroughly explored with the finger, revealing a diffuse cauliflower growth of the endometrium, portions of which were removed with the sharp curette, and examined microscopically. Diagnosis, adeno-carcinoma. Vaginal hysterectomy, with forcipressure. Discharged cured at the end of six weeks. Ten months later the patient had recurrence in the lumbar glands.

The specimen is clearly carcinoma of a particularly malignant form, that has deeply infiltrated the muscular tissue and has begun to ulcerate, rendering the prognosis much more unfavorable than in the two preceding cases. The after-history has confirmed the opinion which was then expressed, although at the time of the operation there was no evidence that the glands or perimetric tissues were involved.

ANATOMY.—It is unnecessary to dwell upon the histological appearances of such a familiar growth as adenoma. I have already stated that *endometritis glandularis hyperplastica* is not adenoma at all, which is readily demonstrated anatomically by the fact that in the former the mucosa is generally hypertrophied, there is enlargement, but not marked proliferation of pre-existing glands, and the process is absolutely confined to the mucous layer; moreover the proliferation is always typical. That cancer may develop directly from such a condition is a question as yet *sub judice;* it may be affirmed by purely clinical observers, but when such careful students as Ruge and Veit declare that they have never yet met with an example of this transition, we must be content to regard it as not proven. On the other hand the development of carcinoma from true adenoma is unquestioned, as shown in Breisky's classical case; the malignancy of the neoplasm, even before the atypical proliferation of the glandular epithelium, so as to form solid columns, and the formation of outlying epithelial cell-clusters, is shown by its invasion of the submucous muscular layer and the disappearance of the interglandular fibrous tissue, in consequence of which adjacent glands are crowded together, forming glomeruli which Schröder has compared to a mass of earth-worms.

SYMPTOMATOLOGY.—I have no intention of claiming a distinct set of symptoms for the neoplasm under discussion, though Winckel has done so. On the other hand I would not affirm with Ruge that they are

never distinguishable from those of cancer. I believe that malignant adenoma is a distinct pathological condition which, although it inevitably tends to pass into carcinoma, is not in its initial stage carcinoma, and would call attention to the fact which is clearly shown by the histories narrated, that there are some essential points of difference. Thus, it is evident that cancer of the body of the uterus would not exist for from three to five years without the occurrence of such retrograde changes as would either destroy life from exhaustion, or would seriously affect the patient's health. After continuing for so long a time there would certainly be more severe pain, more profuse hemorrhages, a foul discharge, septic infection, and involvement of the glands and perimetric tissues. Witness the contrast to Cases I. and II. presented by Case III. Furthermore, the negative evidence presented by the examination of curettings is of considerable value, since it is always easier to determine with the microscope the probable absence of malignant disease, than its presence.

Diagnosis.—From a surgical standpoint I am not a stickler for the refinements of anatomical diagnosis in these cases. In proof of this I need only call attention to the fact that I performed total extirpation of the uterus in Cases I. and II., although by no means certain that I should find malignant disease, and was much relieved to find that my suspicions were justified. Such symptoms as those which I have mentioned, in a woman who has passed the climacteric, added to the fact that they rapidly recurred after thorough curetting, do not warrant further resort to palliative treatment. With the results of modern aseptic surgery before us, we are not justified in waiting until the diagnosis has been established beyond the shadow of a doubt, and the patient's health has been seriously undermined, before we decide upon radical measures.

Prognosis.—As the history of the few *authentic* cases of adenoma uteri has shown, the course of the disease is usually slow and insidious, but, though less malignant than round-celled sarcoma and medullary carcinoma of the endometrium, its fatal termination is none the less certain. Sooner or later cancer is bound to develop with all its attendant evils, with which we are so familiar. The continued good health of the patient, her freedom from pain, local tenderness and a foul discharge should not deceive us. The end, though delayed, is inevitable.

Treatment.—Although maintaining a somewhat conservative attitude with regard to the question of total extirpation for cancer of the cervix, when it comes to cases of real or suspected malignant disease of the corpus uteri I would adopt the most radical measures. Fürst is right when he says that palliative treatment of the latter does more harm than good; it simply aggravates the trouble. I believe

that every time that adenoma uteri is attacked with the curette it simply returns in a more malignant form; the use of the galvano-cautery may be less objectionable, but it is a blind procedure. "We have scotched the snake, not killed it."

There is no class of cases in which vaginal hysterectomy offers such good prospects of a permanent cure, as in those which form the subject of this paper. The operation is exceptionally easy, as the uterus is small and is perfectly movable, there is no involvement of the glands or parametria, the patient's general condition is good, and above all, the disease is *entirely* eradicated. It ought certainly to afford a surgeon more genuine satisfaction to remove a uterus which is the seat of pure adenoma that has not yet entered the cancerous stage, than to extirpate the entire organ for commencing epithelioma of the portio vaginalis, when the diseased tissue might have been excised by high amputation.

To conclude, the following deductions seem to be justifiable:

Benignant adenoma of the corpus uteri is a misnomer. Neither glandular hypertrophy of the endometrium nor so-called adenoid polypus is a genuine adenoma. The only true adenoma of the corpus uteri is essentially malignant both anatomically and clinically—anatomically because it infiltrates the deeper tissues, and clinically because it recurs after removal and eventually assumes a more malignant character.

Malignant adenoma is not at the outset identical with adeno-carcinoma, but may be regarded as the initial stage of the latter, having many of the same symptoms. Rapid recurrence after removal by the curette of an intra-uterine growth which does not appear to be distinctly malignant histologically, and has existed for a considerable length of time, should suggest the probability that it is adenoma, provided that the patient, although at the age when cancer of the corpus uteri is most common, does not have the foul discharge and cachexia attending advanced malignant disease.

A positive diagnosis is possible only after digital explorations of the uterine cavity and the removal with the sharp curette for microscopical examination of a bit of the suspected growth, with the subjacent muscular tissue.

As soon as the diagnosis of a malignant growth is reasonably certain total extirpation of the uterus should be performed without delay. Palliative measures simply favor the more rapid transition to carcinoma, when the prognosis as regards a permanent cure becomes much more doubtful.

A CONTRIBUTION TO THE STUDY OF PRE-COLUMBIAN SYPHILIS IN AMERICA.

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The question whether syphilis prevailed upon the American continent previous to the close of the fifteenth century has a larger measure than the interest of the antiquarian. It is one not without significance for the present, and proposes a problem to modern pathology.

The historical facts upon which it has been sought to rest both the affirmative and negative answers to the question are so well known that the briefest summary of them must suffice for the present purpose.

The ancient literatures of China, India, Greece, and Italy contain unmistakable proofs of the fact that at an early period of the world's history, certain genital lesions were recognized as resulting from sexual contamination. Many of the systemic results of syphilis, not merely in these writings but in those of the Middle Ages, are more or less graphically described. These descriptions are, however, for the most part fragmentary and disconnected; and the conditions they represent are often assigned to other and various disorders; rarely, if ever, are they identified as the results of a previous infection of some particular part of the body. Between, however, the years 1492 and 1494 an epidemic of syphilis spread over France, Spain, Italy, Switzerland, the countries bordering on the Rhine, and other parts of Europe, which eventually became as formidable in its effects as it was general of diffusion. Its prevalence was greatly aided by the campaigns of Charles VIII. of France, who, in his expedition to Naples, led an army of between eight and ten thousand men into the plains of Italy. He crossed into Piedmont on the 8th of December, 1494. His army was officered by young men of aristocratic connections, leading the loosest lives. The rank and file, following the example of their dissolute commanders, were successively quartered in most of the larger Italian cities, and, in the license of unrestraint, did not hesitate to pillage Rome. As a consequence, syphilis was offered to the study of physicians on a broader scale than ever before. Its phenomena were now carefully noted and its earliest and later symptoms recognized as phases of the evolution of a single specific disorder. Fracastor wrote his poem; Isla, his treatise; Sydenham, his letters. The affection soon passed from beneath the uncertain shadows of the mysterious into the calm scrutiny of science.

On the 4th of January, 1493, the Admiral Christobal Colon, better known to us as Columbus, sailed with his company from the West Indies in the Pinta and Nina. They reached the shores of Europe by the fol-

lowing March. Ruy Diaz de Isla, a physician of Andalusia, stated that he had treated some of this company for syphilis, the symptoms of which had first appeared on shipboard before the landing. On the 14th of June of the next year Nicholas Scyllatius reported syphilis as prevalent in epidemic form. The great captain, Gonzales Fernandez de Cordova, soon after left Spain, and in a second Italian campaign against the arms of Louis XII., brought his Spanish troops in contact with the French. Oviedo not only stated that the disease was introduced into Europe from the West Indies by the fleets of Columbus, but added that he was personally acquainted with some of the navigators who had acquired the disease from this source; and gives the name of one of these sufferers, personally known to himself as also to their majesties of Castile. He is also authority for the statement that Cordova, when he was sent to Italy, had in his army persons who were known to be infected.

Six years after Columbus sailed from Hispaniola the devout Las Casas writes of his Indian converts that they freely admitted the prevalence of the disease amongst themselves long before the advent of the Christians; and that the latter were far greater sufferers from the pestilence than the natives themselves. Sir Hans Sloane, who visited the West Indies in 1687, Robertson, the historian, and others whose names are as well known, have, after careful research, expressed their belief in the American origin of the malady. In our own country, Professor Joseph Jones, of New Orleans, may be cited as a classical writer on this theme. His explorations in Kentucky, Tennessee, and elsewhere have led him to conclude that syphilis existed in this hemisphere at a remote period of the past; but even if prevalent in the crowded West Indian Islands at the time of their first visitation by Europeans, did not for that reason necessarily exist upon the Northern and Southern continents. He cites, on the contrary, John D. Hunter, who, after a long captivity among the Indians, declared that they suffered from the disease, but that they had contracted it after communication with the white race.

Two interesting papers have also been contributed to this subject by Dr. Gustavus Brühl, of Cincinnati, Ohio, which embody the fruits of considerable historic research. They contain several interesting arguments having an etymological basis in favor of the existence of pre-Columbian syphilis in the Western Hemisphere. The writings of Sahagun, Torquemada, Roman, Mendieta, Pane and others show as to New Spain—first, that the bodies of those affected with syphilis were interred, as distinguished from those dead of other disorders, which were cremated; second, that the infected were not deemed fit for religious sacrifices; third, that they were represented at the festivals; and fourth, that the disease was counted a punishment sent from the gods for the non-performance of religious rites and other offences. The author also shows that the Mexicans not only recognized the connection between

the earliest and later manifestations of the disorder, but distinguished between several types of the former, understanding also its remedial treatment far better than the Spaniards, even seeking thermal resorts for the purpose of securing relief. He quotes from seventeen Indian dialects, each of which has a primitive and native term for designating the disease, none of the terms thus employed suggesting their confrontation with a new malady, although soon after contact with the whites they were compelled to apply new names for many novel objects with which they were to become familiar. These new names either bear witness to the impression on their ears made by the speech of the Castilians, or describe some prominent feature of the object to be newly named, a rule distinctly observed by them in the case of diseases known to have been imported from Europe to America, as for example, measles and smallpox. The singular confusion existing in the Mexican language of the sixteenth century, of the terms employed to indicate ideas of power, divinity, and the special disease here under discussion, possesses an interest in view of the fact that this is recognized in the dialects of Quechua and Aymerás three hundred years before Pizarro conquered the capital of the Incas.

But to the inhabitants of the Northern part of the Western Hemisphere, the chief interest which to-day attaches to this question rests upon the discovery of bones which have been disinterred in different parts of the country, many of them of great age, presumed to be prehistoric, some of which exhibit traces of disease thought to be syphilis. Such are those exhumed by Professor Jones, who claims that some of those taken by him from the Indian cemeteries are the "oldest syphilitic bones in existence." Others have been disinterred in California, Colorado, and elsewhere within the boundaries of the United States. Only one who has had the singular opportunity of examining all these specimens can speak with authority upon the conclusions which their study justifies. In the pages which follow reference is had only to those either examined by myself or to those represented by portraits in my collection. The following list of photographs may be regarded as fairly representative of these collections:

No. 1. Two incomplete human tibiæ from a mound in Alamada County, California, furnished me by the kindness of Dr. Billings, from the collection in the Surgeon-General's Office of the War Department, U. S. A.

No. 2. A group of tibiæ and fibulæ from a burial mound near St. Francis River, Arkansas, furnished me by the kindness of Professor F. W. Putnam, of the Peabody Museum of American Archæology and Ethnology in Cambridge, Mass. Figs. 2 and 3.

No. 3. A skull with other diseased and healthy bones, all from the same skeleton, from a burial mound in Colorado, furnished me from same collection. Figs. 4 and 5.

No. 4. Two tibiæ, selected from other bones of a skeleton in my own collection sent to me by Dr. J. W. Brown, Mr. Thomas M. Trippe, and Mr. Mentzel, exhumed from a prehistoric burial site on the Animas River, Colo-

FIG. 1.

FIG. 2.

FIG 3

FIG. 4.

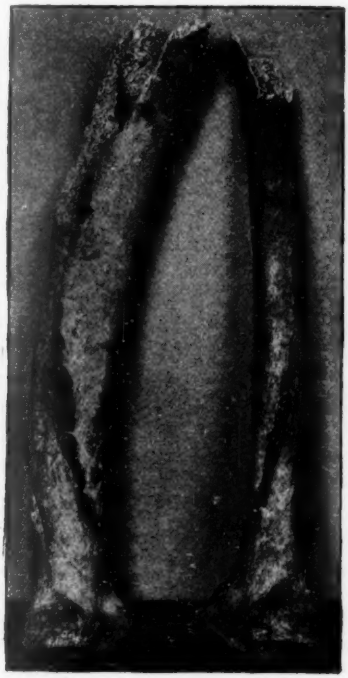
rado, about forty-five miles distant from Durango. In the process of exhumation of this skeleton the skull was found so far disintegrated that on exposure it at once crumbled to fragments. Fig. 6.

Comparing the general features of the bones shown in these photographs with those elsewhere collected, figured, and described, as probably the seat of syphilitic lesions, I believe that they may be regarded as fairly representative of the entire group. For the purpose of readier comparison, I have also studied photographs of

No. 5. A left tibia, showing hyperostosis of the entire shaft, with some shallow depressions where it is supposed suppuration had occurred. The upper half shows abundant exostosis over all its surfaces, the joint being involved. Weight of bone thirty ounces. From a negro whose entire skeleton was involved in syphilitic changes. (Surgeon-General's Office.)

FIG. 5.

FIG. 6.



No. 6. Calvarium; the outer table showing numerous erosions, some large and deep, others small and superficial, which corresponded in the recent state with small pinkish gummata of the pericranium; a few perforations; many exostoses. The inner table shows many erosions and closely set osteophytes. From a colored man aged forty-two years. (Surgeon-General's Office.)

No. 7. Right tibia, showing marked nodular irregularity, resulting from gummatous tumors. The left tibia less strikingly affected with similar lesions. From a Saladoan. (Surgeon-General's Office.)

No. 8. Lower ends of femora with patellæ, tibiæ, and fibulæ, showing results of inflammation, probably syphilitic; surface of bones, especially of front of tibiæ, very irregular, with marked depressions and new growth of bone; general osteoporosis. Osteomyelitis; ossifying periostitis. Removed from a mulatto woman aged forty-one years. (Surgeon-General's Office.)

No. 9. Left tibia, the upper third of which presents subperiosteal necrosis and deeper fistulous passages; the middle third of the bone shows the same condition to a less extent; and in addition, especially on its posterior surface, an abundance of spongy osteophytes. From a white man, age unknown; disease supposed to be result of exposure; leg amputated above knee; patient recovered. (Surgeon-General's Office.)

No. 10. Right tibia; tibia osteoporotic throughout and ankylosed to astragalus. From a white man aged forty-five years; had his right foot hurt while jumping, when fourteen years of age; hurt again in 1866 by being

FIG. 7.

FIG. 8.

struck by a falling bar of iron. Inflammation ensued; amputation in lower third of thigh. Patient recovered. (Surgeon-General's Office.)

No. 11. The lower extremities of a clinical patient, lately applying for relief at the clinic in Chicago, affected with inherited syphilis in the right tibia, exhibiting marked deformity, produced by enlargement and antero-posterior curve. Fig. 7.

No. 12. A reproduction of the cuts employed by Fournier to illustrate the bone disease of inherited syphilis described by him as the sabre-blade deformity. (*Lame-de-sabre.*) Fig. 8.

Viewing as a whole the group of exhumed bones whose photographs have been studied, it is clear that the morbid changes they represent are due to forms of inflammation described by Professor Jones as "periostitis, osteitis, endosteitis, caries, sclerosis, and exostosis." "They are," using again the descriptive terms he employs, "thoroughly diseased,

enlarged, and thickened, with the medullary canal more or less completely obliterated by the effect of inflammatory action, with the surfaces eroded in many places." Again: "In many the medullary canals are equally involved with the periosteum." Some of these changes are bilateral, involving—if not equally, to some extent—bones of like name on the two sides of the body. In other cases several different bones of one skeleton are diseased.

The most conspicuous of the features common to the greater number, are the diffuseness, uniformity, and lack of sharp definition of the lesions, represented chiefly by hypertrophy rather than atrophy. The first question then at issue does not concern the existence of these tangible metamorphoses. It is reduced to the inquiry, Are these metamorphoses due wholly or in part to syphilis?

The distorted femur of the skeleton obtained from Colorado seems to have been the seat of an abscess. I have suggested to Professor Putnam that it may have resulted from traumatism by one of the triangular flints employed by the Indians as arrow-heads, wounding bone, periosteum, or adjacent tissues. I am under the impression that he is disposed to entertain the same view. In a sacrum and dorsal vertebra to be found in a collection of bones taken from a prehistoric cemetery in Madisonville, Ohio, the implements named are seen to have penetrated the osseous substance to the extent of about half an inch.

As to the other modifications of shape and tissue exhibited in this group of bones, there is a conspicuous absence of certain features which are to be expected in bone syphilis, and which are seen, however imperfectly, in the group of photographs of bones known to be syphilitic. Here are not the single or multiple, conical, roundish, or flattened, smooth, hard, pea- to nut-sized and even larger nodules which may be found in both the laminated and eburnated conditions. Here are not the circumscribed swellings, well or ill-defined, found at the distal extremities of syphilitic bones, as, for example, near the wrist when involving the radius and ulna. Here are not the atrophic areas whose definition is scarcely less remarkable than that of the tumefaction which preceded. Here is no suggestion of a poorly united fracture, no hint of a superadded "splint," no trace of a circumscribed or even diffuse gummatous involvement, leaving after degeneration, circinate, single, or multiple relics of the process. We search in vain for bone-cicatrices; for smooth or rough mamelonations of the surface, for localized sclerosis. We discover no centric rarefaction of the osseous tissue with a peripheral overgrowth. In the Madisonville collection, however, there are two tibiæ suggesting the gummatous changes in the bones of the syphilitic subject, illustrated in the photographs (already shown) of the skull with numerous erosions, and of the bones of the negro subjects. Professor Jones describes also "rounded ulcerations with glazed surfaces," "tuberculated

ulcerations," "marked eburnifications," and "reticulated ulcerations," in which an ulcer penetrated a network of periosteal deposit with an annular border.

If syphilis actually prevailed among the aborigines of the Northern part of the Western Continent, it is natural to conclude that with only that measure of therapeutic relief which they could command, inherited syphilis must have been proportionately prevalent. It is well known, too, that in the last-named form of the disease bone symptoms are much more frequently encountered than in the acquired form. Yet I have been thus far wholly unable to secure a photograph or a description of any bone in America that can be fully identified as part of a prehistoric skeleton with the lesions of inherited syphilis unmistakably apparent. There is no bone illustrating these conditions, whether historic or prehistoric, in the collection of the Surgeon-General's Office. Professor Putnam informs me that he has many tibiæ of children exhibiting the curves to be seen in the condition described by Fournier as the "sabre-blade" deformity, and well illustrated in the photograph of a clinical patient lately shown before the class in Rush Medical College, Chicago. But in these curves the special changes described by Fournier, Taylor, Augagneur, Parrot, Ollier, Poncet, and others, often recognized in a general clinical experience, are not declared. There are no traces of the chronic or subacute, often symmetrical and multiple, simple or gummatous, osteo-periostites, and osteo-myelites, starting at the epiphyso-diaphyseal junction, and producing the smooth or irregularly undulating annular tumors embracing the bone. Even the "massive distortions" described and figured by Fournier in his classical work on *Late Inherited Syphilis* differ to some extent from those here represented, though suggesting a resemblance in the general contour of the deformed bones.

In order to investigate this matter more fully, I selected for pathological examination the tibiæ of the parts of a skeleton sent me from Colorado, not merely because they fully illustrate the general changes described by most authors as characteristic of prehistoric bones claimed to be syphilitic, but also because it is seriously claimed by the scientific men of special training who superintend the exhumation, that they antedate by a long period of time the relics of the Mound-builders and Cave-dwellers. The mode of their sepulture was different from that prevalent among the races indicated by these names, as also from that which has survived to our own day among the Zuñis.

Upon these bones, submitted to Dr. T. M. Prudden, of the laboratory of the College of Physicians and Surgeons of New York, I receive the following report:

"The bones were two apparently adult tibiæ, both lower ends of which were absent, being apparently crumbled off. Both of the bones presented marked abnormalities which may be best described on the sepa-

rate bones. The lesions of the left tibia are more extensive than those of the right.

"The *left tibia*. The shaft of the bone is bowed considerably forward at its middle and lower portions. The shaft, which is nearly cylindrical, is everywhere greatly increased in thickness, measuring from 4 to 4.5 centimetres in diameter in all parts except at the lower end, where it is slightly smaller. The whole bone is very light in weight.

"About the articular end, at the knee-joint, the bone presents erosions, irregular losses of substance and numerous larger and smaller bony outgrowths—the latter being most marked about the front of the joint and especially about the seat of attachment of the ligamentum patellæ. The fibular articular surface is completely destroyed. The entire surface of the shaft is roughened and porous and beset here and there, especially along the lines of tendinous attachment, with larger and smaller rows and masses of the delicate bony outgrowths called osteophytes. These osteophytes are especially prominent along the lateral and posterior aspects of the shaft. Branching grooves in the surface of the bone and delicate projecting bony plates and spiculæ and ridges contribute to the roughness of the shaft.

"Transverse sections of the shaft of this bone at its middle third show that the bone, which from the outside appears to be largely hypertrophied, is a mere fragile cylindrical shell, the peripheral compact bone being almost everywhere thin and uneven, and the bulk of the shaft consisting almost wholly of irregular cancellous or spongy tissue.

"The more delicate central trabeculæ of the cancellous tissue, which apparently nearly or completely filled the narrow cavity have, except in a few places, largely disintegrated and fallen out with the lapse of time.

"Along many parts of the bone the cancellous tissue pierces the shell of compact bone—which though very thin in general encloses the shaft—and becomes continuous with the osteophytic outgrowths on the surface.

"The *right tibia* is smaller but heavier than the left. The shaft is in general irregularly ovoidal, its antero-posterior diameter in the upper and middle third being about 4 centimetres, its transverse diameter about 2.3 centimetres.

"The shaft presents, especially about its upper end, superficial erosions and osteophytic outgrowths similar to, but less extensive than those of its mate. The whole surface of the shaft is rough and porous.

"Transverse section between the upper and middle third shows an irregular inclosing shell of compact bone, from 1 to 5 millimetres in thickness. This superficial compact bone is in places riddled with larger and smaller very irregular Haversian canals; in places is quite dense and solid externally. On the posterior aspect of the bone along the oblique

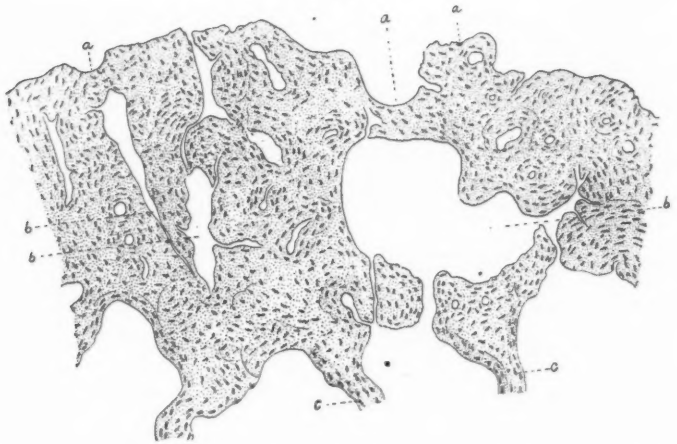
line, the compact substance is pierced by the cancellous tissue, which becomes continuous with the projecting osteophytes.

"Along the middle of the shaft, where it is most perfectly preserved, the cancellous tissue completely fills the narrow cavity.

"The *microscopical examination* of the trabeculæ of the cancellous tissue in both bones shows the usual appearances of such tissue, but the irregularity and apparent aimlessness of their grouping and arrangement indicate their formation under the influence of a chronic inflammatory process. Microscopical examination of the osteophytes shows the irregular grouping and relative positions of the bone cells and bone lamellæ, which is usually associated with such inflammatory structures. The microscopical examination of the more compact bone tissue from various places in the shafts of both bones shows the utmost irregularity in the arrangement, size, and direction of the Haversian canals and their surrounding lamellæ.

"The porous surfaces of the shafts show the eroded depressions, the irregular entrances for bloodvessels, and in places the closely grouped

FIG. 9.



Howship's lacunæ which indicate the formation and absorption of the superficial layers of bone under the influence of chronic periostitis. The appearance of a considerably magnified transverse section of the more compact bone of the right tibia, near its surface, is shown in Fig. 9.

"The articular surfaces of the knee-joint do not seem to have been the seat of chronic inflammatory changes. But, judging from the large osteophytic outgrowths about the upper end of the left tibia, it seems not unlikely that this joint was stiff.

"Although there is no doubt that a certain amount of alteration in the external appearance of these bones has been produced by weathering or disintegration, yet the examination of their surfaces, even with a low magnifying power, shows most conclusively that they have been remarkably well preserved. The delicate sharp-edged openings through which the new-formed bloodvessels from the inflamed periosteum entered the bone; the sharp-cut grooves along the surfaces in which the superficial bloodvessels lay as the new-formed bone spiculæ and lamellæ were built up about them, as well as the still finely preserved delicate projecting osteophytic masses, all show that to the vital processes of disease and not to disintegration or weathering are these various superficial changes due.

"If, then, we sum up the various departures from the normal which these bones present, in the form of an *anatomical diagnosis*, we find that they prove the existence of *chronic rarefying and formative osteitis, with osteomyelitis and chronic formative periostitis.*

"Remarks on Morphological Characters and Causation.—It is evident that these are the bones of an adult who for a long time had been the victim of an extensive chronic bone disease in both legs, with a probable involvement of the left knee. This disease was so extensive and prolonged that it had led to the nearly complete making over of the shafts of both tibiæ.

"Under the influence of the inflammatory process the old bone was bit by bit absorbed, new bone being in greater or less degree formed near by to take its place. The new-formed bone, however, as is usually the case in chronic formative osteitis, has been only here and there developed in the proper amounts, situations, and relationships, so that it furnishes but a poor makeshift for and imitation of the original structure. Thus, while the right tibia, although the seat of profound disease, has fairly maintained its shape and functions, the left, although about twice as large as it should be, is a mere shell-covered spongy cylinder, which, yielding to the weight of the individual, has been bowed strongly forward.

"It seems probable that the disease was in progress at the time of the individual's death, because the evidences of repair are only such as are apt to go hand-in-hand with the destructive process in the chronic bone disease of this kind, as we know it to-day.

"Morphologically, the character and extent of the lesion in these bones is perfectly evident. When, however, we come to consider the probable cause of these extensive changes, the difficulties in arriving at a definite conclusion are very great. Whether the alterations are due to a specific cause—that is, to syphilitic infection, or to some other agency, it is, I think, not possible to say with even a measurable degree of positiveness. There is no evidence whatsoever in these bones that there has been either

caries or necrosis. There has been, so far as the bones show, simply such a general rarefying and formative osteitis with formative periostitis as to have produced the condition often described as spongy hyperostosis. There is no evidence whatsoever, so far as I can see, of the presence at any time of the more common and typical circumscribed nodular or gummatous lesions, which are alone characteristic of syphilis of the bones. There are none of those circumscribed local losses of substance, associated with more or less localized sclerosis, which speak for the former presence of gummata. On the other hand, there is, as is well known, a more diffuse and general inflammation of the bone and periosteum which not infrequently occurs in the tibia, and which is believed to be due to syphilitic infection. But even in this form of syphilitic bone lesion, the sclerotic rather than the rarefying character in the inflammation, as is the case here, is, I think, apt to prevail.

"That the individual was not the victim of any phase of hereditary syphilis which induced developmental malformations of these bones, is evident from the sufficiently well formed upper articular extremities.

"Still, again, a simple non-specific general rarefying and formative osteitis with formative periostitis leading to just such bone changes as are present here, and with a predilection for the tibia is of no very uncommon occurrence.

"On the whole, then, while I am disposed to think that there is nothing in the morphological condition of these bones which would forbid the assumption that the lesion might have been induced by the atypical form of syphilitic inflammation, they present, nevertheless, no morphological evidence to justify such a belief."

In the limits of this paper the effort has been made to restrict the discussion to the main point at issue. What other diseases may be represented in these morbid changes, in no way related to syphilis, is a question for the general surgeon, the pathologist, and the practitioner. Whether the septic forms of myelitis and periostitis with their consequent involvement of the bone tissue proper, may here be recognized as due to the influence of the staphylococcus pyogenes albus and aureus; whether tuberculosis, or the exceedingly rare inflammations of bone due to rheumatism, may be here assigned some place; or, what is in this connection of more consequence, whether a special disease of the bones, not syphilitic in character, prevailed among the aborigines, as it is said to prevail to-day among the native tribes of some regions of this country, there is not here space to inquire.

Admitting that among the bones exhumed in the Northern part of the American continent, and found in the various collections of this country, there are some which actually exhibit unmistakable lesions of syphilis, the last problem prescribed for solution is: Are any of these bones not merely syphilitic but unquestionably prehistoric? Are they parts of

the skeletons of North American Indians or of the whites mingled with the latter in the confusion resulting from race admixture in war, captivity, and many common enterprises? Are they, in point of fact, the bones of individuals dead before the first of the Spaniards set foot on the soil of San Salvador—or, in other words, of those dead before the year 1496? When we turn to the archæologists for a response, we are at once impressed with the fact that the romance once attaching to the prehistoric races of America has been dissipated by the researches of science. The conjecture that a people once dwelt on this soil of some pretension to civilization, building temples and cities comparable to those found in what we call the older world, has been removed by a more rigid study of the relics of the dust. The artificial mounds and stone dwellings, numbering thousands, some of very small and some of imposing size, and scattered throughout the country, were once thought to be the work of an ancient race of people commonly called the "Mound-builders" and the "Cliff-dwellers," who were cited as a people showing evidence of an ancient civilization of no mean order and no common condition of culture. The bones which have been found in many of these mounds and in other places of sepulture, with the so-called works of art which these tombs contain, have been regarded as the remains of these primitive peoples.

These views have within a decade been shown to have a broader basis in the imagination than in tangible fact. From about the middle part of the Pleistocene period to the epoch of the first advent of the whites to the American coast, the history of man in America is seen to be the history of his slow and feeble evolution from a lower to a higher advancement in the Stone age. The best product of this process of evolution was reached by the North American Indian when he first looked seaward upon the sails of the Spanish fleet. There had been nothing superior to him before; and it is a question whether anything better has been since produced by this process of evolution from his race. He built no cities; he carved no vases; his work in metals was of the crudest sort. He and his fathers, his inferiors in culture, builded these mounds for sepulture and other purposes, sometimes as the foundation for communal dwellings. In some portions of the southwestern parts of the country where there is little vegetation and the plains are arid, he and his fathers excavated lodgings in the cliffs that hemmed in the canyons, or constructed them of the loose rocks that were easily separated from the walls of stone on either hand. But all the mounds are not prehistoric; and the same may be said of the excavated cliff dwellings. Even of the prehistoric mounds, some have been occupied in our own day, and some have been used for the interment of bones of individuals dead long after the admixture of the white and red races upon

our soil. Of the glass beads, the tools and ornaments of copper, and other articles found in them suggestive of contemporaneous interment with the human bodies, many were manufactured by the whites and furnished to the Indians in the way of barter for peltries. It is also of importance to note that even within the mounds which are unquestionably of prehistoric structure and which undoubtedly at the first contained only the bones of a prehistoric race, there have been repeated intrusions, and these intrusive interments have resulted in depositing in such mounds, not merely bones of later generations surviving the Columbian advent, but, indeed, large bundles of such bones, some of them apparently collected from the most miscellaneous sources.

The wide door to confusion opened by the complete recognition of facts of this character cannot be ignored. It furnishes a possibility for errors which it would be difficult to number and impossible to overestimate.

In order to demonstrate in the case of bones obtained from any mound or burial-place of the cave-dwellers in North America, some of which exhibit evidences of syphilitic lesions of a suggestive or even unmistakable character, that the latter are proofs of a pre-Columbian prevalence of the disease, it is absolutely necessary to prove beyond question; first, that such mound or burial-place was prehistoric in construction; second, that such contained bones were interred at a prehistoric period; third, and lastly, that after such burial there had been neither intrusive interment of bones nor other disturbance of mortuary relics after their first deposit.

From what precedes it is not difficult to conclude that positive proof of the prevalence of syphilis among the prehistoric races of America, based upon osseous changes, is scarcely yet at hand. With every passing year it may be remarked, the chances of securing such unequivocal demonstration are diminishing. As yet, we cannot say of any bone in our collections, that the demonstration both of its syphilitic character and prehistoric existence is without a flaw. We must, however, do full justice to the fact that an incredible amount of labor and of a praiseworthy American scholarship render it exceedingly probable to the mind of the unprejudiced that syphilis existed among the natives of the crowded West India Islands before the first visit of the whites. Even if some of the latter had been affected with a mild form of the malady, such as is described in the writings of the medical men of Europe before the fifteenth century, we can readily understand that the enormous culture-field offered by a race either virgin of that disorder or suffering from it in a mitigated form, might have been the effective origin of such a virulent epidemic as that which spread over Europe soon after the French invasion of Italy.

The appended titles are those of a few only of the works and papers that might be cited in this connection:

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NITROGEN MONOXIDE AND OXYGEN FOR ANÆSTHESIA IN MINOR SURGICAL OPERATIONS.

With a Report of Fifty Cases.[1]

By William Waldo Van Arsdale, M.D.,

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In some physiological text-books we are told that mixtures of nitrous oxide and oxygen gas may be inhaled with impunity for any length of time, and when thus inhaled produce anæsthesia without unconsciousness. If this were true we would have in such mixtures the ideal anæsthetic that has for so long a time been the dream of many surgeons. A perfectly safe anæsthetic, respirable for hours by the patient, which would never fail to produce complete anæsthesia during any operation, and yet not render the patient unconscious, would be hailed as an advance in surgery.

In a recent paper read before the International Congress at Berlin, Horatio C. Wood spoke of such a "perfect anæsthetic," but added: "If such a drug exists (which has the power of paralyzing the sensory nerve-trunks without affecting other functions of the body) it yet awaits the coming of its discoverer."

[1] Read before the New York Surgical Society, with a demonstration on a patient of the method employed, Dec. 10, 1890.

Unfortunately, the above assertion in regard to the mixtures of nitrogen monoxide and oxygen requires considerable modification before it can be experimentally and clinically verified. If, however, there has been some advance toward finding the ideal anæsthetic referred to, this advance has been achieved by means of experiments conducted with such mixtures.

The use of pure nitrogen monoxide, so serviceable and efficient in dental practice as an anæsthetic, is not entirely so in surgery, even for minor operative procedures. It is true, for such operations as are of the very shortest possible duration, such as the incision into an abscess, it is a very valuable aid to their satisfactory performance, and one which we can ill afford to do without, whenever we have so great a number of such operations to perform that the question as to the amount of time spent on each one becomes an important one—as is the case in our public dispensaries.

But the short space of time during which complete anæsthesia, with loss of all reflexes, can be maintained by the administration of pure nitrogen monoxide interferes with the proper circumspect performance of the majority of operations generally classed together as minor operations (which we are called upon to perform in our clinics and dispensaries), especially when we make extensive use of the antiseptic method.

The opening and drainage, with incidental irrigation, of a palmar abscess, the cleansing and suture of an incised wound, the treatment of an abscess of the mammary gland, or of an acute suppurative lymphadenitis of the neck, cannot be satisfactorily conducted with the administration of pure nitrogen monoxide. I have myself used this anæsthetic in some 400 cases of the kind above described, and have always been oppressed by the sense of having to use undue haste in the performance of these small procedures.

But when such minor operations as the extirpation of ingrowing toenails, or the removal of cystic tumors of the scalp were to be performed, the administration of nitrogen monoxide in its pure form proved totally unsatisfactory and could not in any way compete with the use of cocaine.

Pure nitrogen monoxide, if given continuously, will produce complete anæsthesia with unconsciousness, on the average, in two minutes and eight seconds; and total cessation of respiration in about three minutes, on the average, which means death by asphyxia unless oxygen is speedily supplied. It is the deep cyanosis of the skin, and the dark-blue color of the blood flowing from the wound that induces the surgeon to abandon the anæsthetic before death ensues, and this, together with the fact that the heart continues to beat after respiration has ceased, constitutes the comparative safety of this anæsthetic—a safety which, however, exists only at the expense of the oftentimes unsatisfactory completion

of the operation. The clonic spasms which occur before death are also liable to displace the mask and thus admit air into the lungs.

Although in many cases death may not occur so soon, in others it has occurred as early as after two minutes' inhalation of nitrogen monoxide. I recall only two cases where, before even the incision of an abscess could be accomplished, a state of asphyxia had obtained which was the cause, for some moments, of considerable anxiety on the part of the surgeon before the patients finally recovered. Both cases occurred in children, who generally take nitrogen monoxide very well.[1]

The physiological action of the nitrogen monoxide is now generally admitted to consist in shutting off oxygen from the blood. This action is not to be confounded with simple asphyxia after mechanical occlusion of the air-passages; because in this latter case there is carbon dioxide present in the blood, which acts as a poison.

In asphyxia occurring after administration of pure nitrogen monoxide, there is simply a lack of oxygen in the tissues.

It is true, Ulbrich asserted that spectroscopic analysis of blood saturated with nitrogen monoxide showed no hæmoglobin to be present. But latterly Rothmann, by using more diluted solutions of such blood, established the presence of the hæmoglobin spectrum unimpaired, so that it must be conceded that there is no chemical action of the nitrogen monoxide upon the blood other than the simple shutting off of oxygen.

If, therefore, there is any interference with bodily functions in consequence of the inhalation of pure nitrogen monoxide, this may be due either to the specific action of the nitrogen monoxide (which is probably the cause of anæsthesia, as the experiments done with mixtures show), or it may be due to the absence of oxygen; and this latter condition is probably the cause of the changes in the pulse and respiration, in the blood-pressure, and of the clonic spasms and tonic muscular contractions, observed after inhalation of nitrogen monoxide.

The action of the gas on the pulse and respiration has been described in a paper recently read before the National Academy of Medicine by Wood and Cerna, who found the pulse-rate decidedly slowed, while the arterial wave was enormously increased in size (due to stimulation of the inhibitory cardiac apparatus). The blood-pressure is extraordinarily raised, sometimes only momentarily and abruptly, and at various stages during the anæsthesia; but present in the majority of cases.

The respiration very soon fails, and ceases entirely at a time when the heart is yet in full action.

When viewed as an anæsthetic to be admitted into general surgical

[1] From a verbal communication on the part of my colleague, Dr. Swinburne, I learn that he has observed four such cases, also occurring in children, in which considerable momentary apprehension was caused from an overdose of pure nitrogen monoxide, but in which perfect recovery followed.

practice it is evident that nitrogen monoxide in its pure state may never aspire to that position of usefulness occupied by ether and chloroform.

In the first place the danger attendant upon its administration for a longer period of time than three minutes, on the average, renders its use unsatisfactory.

Secondly, the action on the pulse at the commencement of the anæsthesia, and the increased blood-pressure, are serious drawbacks and a positive contra-indication to its use in a number of cases.

If anæsthesia, once induced with pure nitrogen monoxide, is to be maintained for any considerable length of time, this can be only achieved by admitting air in greater or smaller quantities into the lungs of the patient, by which means the occurrence of complete asphyxia may be repeatedly postponed.

This method has been in extensive use for some time. The administrator watches the skin of the patient, and when cyanosis becomes so deep that a further increase of the asphyxia appears alarming, sufficient air is admitted to postpone, for a time, the complete arrest of respiration. Or a certain quantity of air may be admitted, intentionally or unintentionally, along with the nitrogen monoxide from the first. It depends upon the skill of the administrator to keep the patient between the two evils of complete cessation of respiration and the awakening to consciousness with the return of the reflex motions and struggling.

With great skill and experience on the part of the operator, however, a prolonged narcosis can be maintained, presenting much the same effect as chloroform anæsthesia, and there are in the literature a number of such cases where anæsthesia was maintained for an hour and more.

But in all these cases cyanosis was continued and pronounced, and the blood that flowed from the wound was of very dark color.

When we consider that this cyanosis is actually due to the want of oxygen, and that we have to deal with a condition of incomplete asphyxia continued for a long period of time, it appears questionable whether its effects may not result from this practice. There is a state of asphyxia of the tissues, which leads to inflammatory changes with subsequent degeneration.

An Esmarch bandage applied to the limb of an animal will, by shutting off the oxygen supply of the blood, produce such great molecular changes in the muscles (disappearance of the nuclei and inflammatory conditions) that they can be seen and studied with the microscope, as Leser has shown. And this occurs after three hours' application of the bandage. It is, therefore, not out of place to question whether such tissue-asphyxia may not be induced quite as readily by prolonged narcosis by mixtures of nitrogen monoxide and air.

Another point may here be mentioned. When only a little air is admitted along with the nitrogen monoxide, as soon as this air has

entered into the lungs carbon dioxide appears in the blood. So that these patients present the same conditions as do patients suffering from simple mechanical asphyxia. Now, we know when patients pass from asphyxia produced by carbon dioxide poisoning to complete suffocation, they do so without muscular spasms or convulsions. We see, therefore, that although the anæsthesia with mixtures of air and nitrogen monoxide may keep the patient more quiet as to muscular reaction, it does so at no small detriment to the system. Indeed, I much question whether the sugar found in the urine after prolonged anæsthesia with nitrogen monoxide is not the expression of such detriment to the system.

Still another disadvantage may be here considered, which often attaches to these narcoses maintained by the admittance of air with the nitrogen monoxide, and that is the subjective sense of strangulation on the part of the patient. This sense is not always pronounced, however, and does not usually interfere with the performance of the operation.

In view of all these disadvantages attaching to the administration of nitrogen monoxide, either in its pure state or when mixed with air, it is not strange that many attempts should have been made to obtain all the benefits of such an agreeable and safe anæsthetic as nitrogen monoxide has the reputation of being, without its drawbacks and disadvantages.

One of the most evident methods of avoiding the danger lying in the asphyxiated condition resulting from inhalation of the nitrogen monoxide is the admixture of pure oxygen with the gas. This method has been repeatedly tried and again abandoned, so that surgeons in general had lost all hope of practically introducing it into general use.

According to Von Bruns, Hermann was the first to mix the gases, taking seventy-eight parts of nitrogen monoxide and twenty-two parts of oxygen, thus imitating our own atmosphere in the quantity of oxygen. He found that this mixture produced anæsthesia without loss of consciousness. Subsequently Von Bruns tried this mixture for surgical purposes, but was unsuccessful.

The most distinguished effort in this direction was made by Paul Bert in 1878.

His method of reasoning was simple: Pure nitrous monoxide causes anæsthesia at atmospheric pressure, but also asphyxia. The latter can be obviated by the admixture of as much oxygen as is contained in our atmosphere—*i. e.*, one volume of oxygen added to four volumes of the nitrogen monoxide. If, however, this admixture is made, the tension of the nitrogen monoxide in the mixture is not as great (by one-fifth) as it was before the admixture, and consequently no anæsthesia will be produced. In order to remedy this it is only necessary to increase the atmospheric pressure by just so much as the tension of the nitrogen monoxide gas is weakened by the addition of oxygen, namely, by one-

fifth atmosphere. If this be done the result of inhalation will be anæsthesia without asphyxia.

The practical problem presenting itself for solution was how to obtain the atmospheric super-pressure. It was solved by Paul Bert by building a hermetically sealed glass cage with proper arrangements attached for increasing the atmospheric pressure. Into this cage the patient and the surgeons and assistants were all admitted, and here the gas was administered.

The practical obstacles in the way of this method are the expense of the apparatus, which alone amounted to 10,000 francs, and the difficulty of its transportation.

With this arrangement, however, success was manifest. A large number of operations were performed by L'Abbé and Péan, and the following observations were made:

With an admixture of 20 per cent. in volume of pure oxygen to the pure nitrogen monoxide, anæsthesia was almost instantly induced as soon as the patient commenced inhaling it. It could be continued for any desirable length of time. When inhalation was interrupted the patient instantly recovered. After anæsthesia no headache, no nausea, no digestive disturbance, was observed. No vomiting occurred. In short, the compound appeared perfectly safe and innocuous.

We have here an ideal anæsthetic for surgical use, but the practical difficulties in the way of its general introduction are insurmountable.

In the second year following, Raphael Blanchard published a monograph in which sixty operations of a major and minor character, some of over one hour's duration, were reported, all done after the same method of Paul Bert, and confirming his conclusions.

One year later, in 1881, Klikovitch, of St. Petersburg, began further experiments with a mixture similar to that used by Paul Bert in obstetrical practice and during parturition. He came to the conclusion that, for the purpose of rendering parturition painless, the inhalation of the mixture without additional pressure was sufficient. The patients retained their consciousness, although it was generally somewhat dulled.

The anæsthesia was not complete, however, the pain being merely diminished in some cases and not entirely removed.

The conclusions of Klikovitch were: (*a*) that the mixture was entirely free from danger for the mother and the child; (*b*) that pain was undoubtedly diminished; (*c*) that consciousness was not interfered with; (*d*) that no vomiting or intestinal disturbance was induced; (*e*) that no cumulative action of the gas mixture could be observed; (*f*) and that the mixture could be administered even without the presence of a physician; (*g*) but that the apparatus was not readily transportable and that the procedure was too expensive.

These observations were corroborated by Tittel, of Dresden, and by

E. Cohn, of Berlin, and I may add that we have two further contributions to the literature regarding the use of the mixture during labor. The one by Swiecicki, who writes in favor of its use, and the other by Doederlein, who was not so favorably impressed by it. An attempted incision of an abscess of the mammary gland was a failure as far as the anæsthesia was concerned. Both used a compound consisting of 20 per cent. of oxygen and 80 per cent. of nitrogen monoxide, without atmospheric super-pressure.

The first successful major surgical operation with a less cumbersome apparatus than that of Paul Bert, appears to be one published in 1888 by Witzinger.

A mixture was administered composed of twelve volumetric parts of oxygen and eighty-eight of nitrogen monoxide and continued for eighteen minutes, during which time Von Mosetig-Moorhof performed a resection of the hip-joint. The operation had not been completed when the supply of the mixture gave out and chloroform had to be substituted. In another operative case, however, also of a major character, but occurring in dispensary practice, the compound failed entirely; while in two minor operative procedures the anæsthetic was administered with success.

In these cases the gas compound was not administered under pressure; but the percentage of oxygen was reduced from that employed by Paul Bert.

The clinical observations made during the operation of hip-joint resection were as follows: Narcosis was complete after one minute and two seconds. There was no preliminary stage of excitation. Respiration was calm; the pupils were dilated; there was total absence of muscular tonus. The conjunctival reflex was abolished. The action of the heart was regular and strong.

In the following year, 1889, Gersuny, of Vienna, published eight cases of surgical operations in which Hillischer administered a mixture of twelve parts of oxygen and eighty-eight parts of nitrogen monoxide. The gases were mixed immediately before inspiration by means of a specially arranged stopcock. In six of these cases the narcosis was maintained for from eight and a half to fourteen minutes. In two of them the duration was thirty-three and thirty-eight minutes respectively. The time necessary to induce anæsthesia varied between one and a half and ten minutes. In two cases asphyxia occurred, and the operation was interrupted. Two cases were complicated by vomiting. The pulse was full, between 120 and 140; the blood-pressure sank during narcosis. Respiration was 50, with marked cyanosis in two of the cases. No evil after-effects were noticed.

These few operations are the only surgical procedures I have been able to find recorded in the literature, where use was made of mixtures of oxygen and nitrogen monoxide.

The other cases refer either to experiments done upon animals, or else to the use of the mixture in dental practice. Both of these categories interest us here only in so far as our knowledge of the physiological action of the mixture has been increased by them.

The most prominent among the more recent experiments upon animals published are those done by Wood and Cerna.

They found that the blood-pressure was not raised when a mixture of nitrogen monoxide and oxygen, containing 10 per cent. of the latter, was administered; but that the pulse-rate was reduced, just as in the administration of pure nitrogen monoxide. They also found, however, that such a mixture failed to produce anæsthesia.[1]

As regards the length of time during which the anæsthetic may be administered, Martin, in 1888, narcotized a dog with a mixture of fifteen parts of oxygen and eighty-five parts of nitrogen monoxide, and kept the animal continually under its influence for seventy-two consecutive hours. The dog slept peacefully all the time.

When a similar mixture (12½ parts of oxygen and 87½ parts of nitrogen monoxide) has been used on the human subject in dental practice for the purpose of painless extraction of teeth, it has been customary to mix the gases in a gasometer, and from these gasometers the mixtures generally escaped under slight pressure. A large number of such cases have been reported by Hewitt. 'In these cases, after a few inspirations, a slowing of the respiration was observed, but neither cyanosis nor stertorous breathing ever occurred. The pulse was full, strong, regular, between 80 and 90. These administrations were generally given for about two minutes; sensibility was sufficiently blunted to permit satisfactory work in extracting a tooth; muscular rigidity was sometimes present, and in some cases the anæsthetic failed completely.

In attempting to sum up the information given in all these data, and in the rest of the literature not quoted here pertaining to the mixtures, we are struck by the conflicting statements of different observers. The one statement, on which all appear agreed, is that the admixture of oxygen to the nitrogen monoxide does not cause an increase of the blood-pressure (Hillischer, 1866). The statements as to pulse and respiration vary. Asphyxia did not occur when the gases were previously mixed. But frequently the anæsthesia failed entirely, and often it was unsatisfactory; so that, with the exception of Paul Bert's cumbersome apparatus, surgical practice has as yet not profited much by these observations.

We may refer the lack of unity in the clinical observations made—to

[1] I learn from personal communication that Dr. B. F. Curtis, of this city, has lately performed similar experiments; but they have not yet been published, to my knowledge.

the variations in the methods and apparatus employed by the various administrators.

I now turn to my own experience with the mixtures of oxygen and nitrogen monoxide.

My attention was first called to these mixtures by my colleague, Dr. Moskovich, an expert in nitrous oxide anæsthesia and lecturer in the New York College of Dentistry, who told me, in June, 1889, of the experiments being made at that time in Russia.

I am indebted to the courtesy of Dr. Moskovich for administering the mixtures in all of the cases here reported, with the exception of but two.

The cases thus observed now number over fifty.

At first my efforts were directed toward verifying the facts first published by the physicians in Russia—Klikovitsch and others. Accordingly, I procured from a firm in this city a cylinder containing a mixture of twenty parts of oxygen and eighty parts of nitrogen monoxide, this being the mixture used by Paul Bert and others. The apparatus used was the same as employed for the administration of pure nitrous oxide gas; the S. S. White Inhaler No. 2 being used in connection with a seven-gallon rubber-bag reservoir. The first inhalation was taken by Dr. Moskovich himself, for a short time only, about two and a half minutes in all. After one minute he had lost sensation and consciousness; but there was no muscular relaxation. There was no trace of cyanosis, and subjectively no sensation of suffocation was experienced.

The next case was a successful one as far as the satisfactory completion of the operation was concerned: the incision and drainage of an axillary abscess, to which the patient, a young German girl, submitted without apparently feeling the least pain, although she retained consciousness all the time.

But the following three cases showed that the administration of this mixture produced excitation and incomplete anæsthesia, so that what still remained of the mixture was diluted with pure nitrogen monoxide in order to reduce the quantity of oxygen present to about half its original proportion, or to 10 per cent. With this mixture two successful operations were performed; the extraction of a foreign body in the hand of a woman twenty-four years of age, and the curetting of ulcerating tuberculous lymphatic glands of the neck in a man twenty-nine years of age. In both of these cases the patient was fully under the influence of the anæsthetic in from one to two minutes, and awoke at once at the removal of the inhaler. The anæsthetic was inhaled for four minutes without the least sign of cyanosis or asphyxia.

It was therefore believed that a mixture containing less of the oxygen would do better service; and a mixture containing 15 per cent. in

volume of oxygen was prepared for me by the S. S. White Dental Co., of this city.[1]

This new mixture was administered twelve times. Dr. Moskovich kindly volunteered to inhale it, which he did for over five minutes consecutively. He took large inspirations and breathed naturally the entire time; the pulse was regular and full, not increased in frequency. There was no cyanosis or asphyxia. He remained conscious, however, or almost completely so, all the time. His subjective sensations were hammering and ringing in the ears; he could hear a loud voice, however, and feel a slight touch. The sensation of pain was greatly diminished but not entirely removed; anæsthesia was incomplete. A slight excitation was manifest to the by-standers; he followed our movements with his eyes, which were bright.

The cases treated with this mixture are the following:

Case I.—J. K., female, aged nineteen years; abscess of the palm. Duration of anæsthesia six and a half minutes. Anæsthesia not complete; reflex movements of the hand noticed during the incision. The patient subsequently stated that she had not felt much pain.

Case II.—B. W., female, aged seventeen years; abscess of the hand. Was partly unconscious; did not move the hand during the incisions. She subsequently said she had felt pain.

Case III.—B. K., female, aged eighteen years; abscess of the hand. Was unconscious in three-quarters of a minute. One incision, which was not felt, and not remembered. On awakening after two minutes a hysterical excitation was manifested, which soon passed over.

Case IV.—M. N., male, aged forty years; stricture of urethra. Patient of extreme neurasthenic condition, highly excited and nervous at taking gas. The excitement increased under influence of the mixture. After two minutes, mixture abandoned and pure nitrogen monoxide substituted. It was found impossible to bring the patient under its influence. Wild movements of the limbs, maniacal excitation, cries. Operation postponed to future date.

Case V.—N. M., male, aged fifteen years; complete luxation of forearm backward. The mixture administered for examination and replacement. In one and a half minutes, unconsciousness; no muscular rigidity or spasm, no reflex movements. Immediate revival on removal of inhaler. No remembrance of pain. On questioning, answered that he did not know where he had been. No after-effects.

This patient subsequently took the mixture twice more, and each time with similar excellent results. Massage and passive motion produced no sense of pain.

Case VI.—R. K., female, aged five years; large alveolar abscess. Took mixture for three minutes. Anæsthesia complete, but patient appeared not entirely unconscious. Incision. Immediate recovery.

Case VII.—F. S., female, aged eight years; abscesses of the hand

[1] I take pleasure in acknowledging my indebtedness to the courtesy of this firm in supplying these mixtures, since by this means I was enabled to rely upon the accuracy of measurement and the good quality of the ingredients in each case.

and of the leg. Was given the mixture for six minutes. Consciousness and sensation had ceased after one minute; but slight reflex movements were noticed on incision through the skin.

CASE VIII.—L. E., male, aged three years; mastoid abscess. Unconscious after half a minute. Operation completed after three minutes. No sensation, but muscular rigidity of the extremities continued the entire time. Immediate recovery.

CASE IX.—H. W., male, aged twenty years; ingrowing toe-nail; extirpation of nail. Anæsthesia complete. On recovery, nausea and vomiting.

CASE X.—M. St., male, aged fifteen years; abscess of the jaw. The patient was apparently not fully under the influence of the anæsthetic when the incision of the abscess was commenced. Reflex movements and muscular spasm. Time of narcosis two minutes and two seconds. On recovery the patient stated he had not felt anything at all.

CASE XI.—A. S., male, aged twenty years; abscess at the back of the neck. Administration for two minutes only; anæsthesia complete, but muscular spasm and rigidity were present.

On reviewing these cases it became evident that this mixture is not satisfactory for surgical work, when administered in this manner. Only two cases of the eleven were satisfactory; in the others the muscular rigidity and spasm and the incomplete loss of consciousness interfered with the operation.

I therefore next procured a quantity of gas mixture from the same firm containing ninety parts by volume of nitrogen monoxide and ten parts of oxygen. With this mixture all further narcoses were conducted, and as far as the objectionable feature of the pure nitrogen monoxide anæsthesia—the asphyxia—is concerned, it was always avoided by the use of this mixture. No case presented any symptoms of cyanosis, the patient retaining the normal color of his skin throughout.

One of the first cases in which this new mixture was used was very successful.

CASE XII.—An adult man, suffering from an abscess of the neck, took the mixture and immediately fell into a peaceful sleep. Deep, normal respiratory movements continued and no excitement or muscular rigidity was manifested. The operation was completed in three minutes. The patient rapidly awoke on removal of the mask and had no consciousness of what had been done.

In the further cases treated with this mixture, however, the patients behaved very much as with the foregoing mixtures containing fifteen parts of oxygen to the hundred.

A state of semi-consciousness, combined with more or less muscular rigidity, manifested itself and interfered with the uninterrupted performance of the operative procedures.

It was made out, however, at this time that the chief impediment to

the complete anæsthetization was the failure on the part of the patient to take deep inspirations. In the case of one or two patients (who had no beards) who took deep inspirations, the anæsthesia was much improved. But the natural excitability of many of the patients about to undergo a surgical operation is apt to prevent normal and deep respiration.[1]

As all these methods of administering mixtures of oxygen and nitrous monoxide gas had failed to give satisfaction, it occurred to me that by using pressure to force the gas mixture into the lungs of the patient, the amount inhaled might be increased and at the same time the tension of the nitrogen monoxide gas might be made greater.

This method is an entirely different one from that used by Paul Bert, who placed the patient in an entire atmosphere of greater tension, but did not influence the respiration in any way.

If, however, gas is administered under pressure, the mode of respiration is entirely changed. It approximates more closely to the artificial respiration which we have occasion to observe in our physiological laboratories; but with this difference, that the pressure in our case is constant, while there it is intermittent; moreover, it is not great enough to interfere with the natural expiration.

The practical question presenting itself was the construction of a proper apparatus, which should be readily portable and should permit of an exercise of pressure upon the gas reservoir that could be varied as desired.

The difficulties attending the hermetical connection between the mouth and nose of the patient and the reservoir bag were met by using the S. S. White Gas-inhaler No. 2, which in adults can be held in place so firmly by the administrator of the mixture that no air has access alongside of the mask.

In two categories of cases, however, this adaptation of the inhaler is interfered with. First, in children, for the reason that the mask is too large and admits air below the chin. If it were considered necessary to give the mixture to children under pressure, special inhalers of smaller size would have to be used. But in the case of children I have

[1] In one case the attempt was made to use morphine subcutaneously in order to counteract the nervousness evidenced by the patient. But this endeavor proved a complete failure. The patient, a man, twenty years of age, was to have a toe-nail extirpated. He was of a highly nervous organization and excitable temperament. It was found impossible to get him under the influence of the mixture, and, therefore, pure nitrogen monoxide was substituted. But this had no more effect upon the patient than the mixture. There was unconsciousness, but apparently no anæsthesia, no insensibility. At each attempt to use the knife the patient would remonstrate, and move the lower extremities. The operation was finally completed, but on recovery the patient vomited, and appeared prostrated for some time. He said he had suffered much pain, but did not know where he was.

found that the mixture works quite sufficiently well without additional pressure, so that I have not as yet had such an inhaler constructed. Secondly, in cases where the patient has a large beard, it is difficult to prevent the entrance of air alongside of the inhaler. For this reason the majority of cases, where the mixture was used for anæsthetizing such patients, were failures.

The amount of pressure necessary to induce anæsthesia is a question of some practical interest. According to Paul Bert's theory the tension with which the mixture is administered should bear the same proportion to the atmospheric pressure as the mixture bears to the nitrogen monoxide in the mixture. Thus, if we use a 10 per cent. mixture of oxygen and nitrogen monoxide, it will be sufficient to increase the pressure with which it is administered one-tenth of an atmosphere.[1]

In practice I have not as yet had opportunity to use so great a pressure—partly owing to the delicate construction of the reservoir bag used and partly owing to the arrangement of the mica valve in the inhaler used. The great majority of administrations of the mixture were given with the use of two simple boards of white wood, about two feet square and hinged together. Between these the rubber bag containing the mixture was placed, so that the gas was forced out into the inhaler at a pressure of about three-fourths of an inch of water on an average, this corresponding to a pressure upon the bag of three pounds, and when the gas was nearly consumed the bag was again filled from the cylinder *a tergo*.

Sometimes this pressure was employed from the commencement of the anæsthesia; but more generally the pressure was not added until the patient had inhaled the mixture for a minute or less and was considered under its influence. Then the weight of the upper board was brought to bear upon the bag.

The evident objection to this method of employing pressure is the following. When the two hinged boards approach each other the pressure upon the gas in the bag is increased, and when the bag is full and the boards become more separated in consequence, the pressure is diminished. The tension with which the gas escapes into the inhaler is consequently not equable. I have, therefore, of late contrived another simple arrangement of the two boards, by which they should remain always parallel to each other and thus render the pressure more equable.

[1] To state the problem more correctly, and since the volume of a gas is inversely proportional to the pressure, we may adduce the following proportion:

9 vol. : 10 vol. :: 1 atm. : 1.111 atm.

The total pressure on the mixture should then be 1.111 atmospheres; of this 1 atmosphere will be due to the nitrogen monoxide and 0.111 atm. to the oxygen. Expressed in millimetres of quicksilver, the pressure of the nitrogen monoxide would be 760, and that of the oxygen 84.3.

The upper board is provided with four stout iron wire rods, about two feet long, and attached near the corners of the board after the manner of the legs of a table. These rods are unscrewed from their place for transportation. The rods pass through large holes in the corners of the lower board. The reservoir bag being placed between the two boards is thus exposed to a constant pressure amounting to five pounds and a half in the apparatus.

It will be seen that the administration of the mixture under pressure is a task requiring some skill and attention. In the first place, the mask requires to be held so firmly over the nose and mouth of the patient, that no air may enter alongside of the inflated rubber mounting. Secondly, the administrator should keep the reservoir-bag filled with the mixture during the entire time of the operation, so as not to cause any fluctuation of the tension under which the mixture is administered. At the same time he must watch the respiratory movements of the patient (as indicated by the valve in the inhaler), and the color of the patient's skin.

The first case in which the gas mixture was administered under pressure (in December, 1889), was a brilliant success.

CASE XIII.—The patient, a robust man of twenty years, suffering from a deep abscess of the finger, was given the mixture (containing 10 per cent. of oxygen), at first without pressure for three minutes. During this time he breathed naturally but retained consciousness, and could feel the prick of a pin as painful. Then moderate pressure was applied to the reservoir-bag (about two and a half pounds), and he immediately appeared to fall asleep. After one further minute there was complete atony, insensibility, absence of muscular spasm and rigidity, and absence of reflex movements. He recovered very rapidly after removal of the inhaler, and said he had felt nothing at the time of the operation.

Twenty-five further narcoses were conducted with the use of pressure-boards, and with the same mixture of ten parts of oxygen and ninety parts of nitrogen monoxide.

Many of these may be classed as brilliant successes, while others proved failures from one cause or another; and my attention was directed toward finding out, if possible, what occasioned the failures, so that they might be avoided.

I give the cases, as briefly as possible, commencing with the more successful ones.

CASE XIV.—R. S., female, aged thirty years; abscess of hand. Mixture given for fifteen seconds without pressure; then for three minutes with pressure. Patient completely anæsthetic and unconscious. Incision of abscess. Recovered rapidly.

CASE XV.—B. E., aged twenty years; two abscesses of the finger. Mixture given first for two seconds, then with pressure added for six minutes. Complete insensibility. Incision of abscesses.

CASE XVI.—M. M., male, aged twenty years; abscess of hand. Mixture first given without pressure for twenty seconds, then with pressure. Complete anæsthesia and unconsciousness.

CASE XVII.—M. S., male, aged seven years; foreign body under skin. Mixture given for twenty seconds without, then for one minute with pressure. Extraction of the body. Unconsciousness and anæsthesia complete.

CASE XVIII.—N. S., male, aged thirty years; foreign body under nail. Mixture first given for fifteen seconds, then with pressure. Extraction of body. Anæsthesia and unconsciousness complete.

CASE XIX.—M. C., female, aged twenty-five years; suppurative mastitis. Mixture administered without pressure for twenty seconds, then with pressure. Unconsciousness and anæsthesia well marked, but slight muscular rigidity in the extremities. Four incisions into the gland. On recovery from the anæsthetic the patient had a laughing spell, and was greatly delighted at the fact of the operation being completed.

CASE XX.—The same patient was subsequently treated for other abscesses of the mammary gland, three incisions being made at this time. The anæsthetic was administered in the same way with the same good effect; but on recovery the patient wept and felt pain.

CASE XXI.—L. S., female, aged nineteen years, in the eighth month of gestation; abscess of the hand. Mixture administered for one minute without, then for five minutes with pressure. Two incisions were made. Unconsciousness and anæsthesia well marked; but a little muscular rigidity was noticed.

CASE XXII.—A. B., female, aged (?); suppurative lymphadenitis of neck. Mixture given for thirty seconds without pressure, then for ten minutes with pressure. Incision of abscesses.

CASE XXIII.—M. G., male, aged eleven years; foreign body in gluteal region. Mixture given with pressure. Extraction of two large splinters of wood.

In both of these latter cases some slight cyanosis was observed, the supply of gas in the cylinder being nearly exhausted.

CASE XXIV.—M. N., female, aged twenty years; tubercular lymphadenitis of neck. Mixture given first without, then with pressure. The patient lapsed into a peaceful sleep; unconsciousness and anæsthesia perfect; no reflex movements or muscular rigidity. Incision.

CASE XXV.—L. H., male, aged sixteen years; incised wound of wrist. Mixture administered with pressure from the first. Anæsthesia induced in one-quarter of a minute; kept up for three minutes. Complete unconsciousness and insensibility to pain. Anæsthesia resembling a perfectly calm sleep. No cyanosis; no muscular rigidity. Disinfection and suture of the wound. Quick recovery on removal of inhaler.

There were two or three other cases, not recorded in my notes, which may be mentioned here, where the mixture was exhibited in cases operated upon by my colleague, Dr. Schapringer.

CASE XXVI.—This one was an operation for the occlusion of a lachrymal fistula in a girl aged about six years. The anæsthesia proved perfectly satisfactory, the excision of the fistulous tract and the placing

of the sutures being done with perfect ease during the unconsciousness and anæsthesia of the patient.

Case XXVII.—Another operation was the extraction of a foreign body from the external auditory meatus in an adult man, the anæsthetic being administered in the sitting posture, and giving perfect satisfaction. The patient neither moved nor manifested signs of insensibility during the operation; although on questioning afterward he stated he had felt everything.

There were also some four further cases, of which, however, the notes have been lost.

Besides these successful cases of anæsthesia by this method of administering the mixture under pressure, there are several cases in which the results were less satisfactory.

Case XXVIII.—L. G., female, aged six years; deep abscess of the neck, probably tubercular in character. Mixture administered without pressure for twenty seconds, then with pressure for four or five minutes in all. Incision and evacuation of abscess. The patient manifested a little excitement, breathed rapidly, and showed some cyanosis. (This was the residue of gas in the cylinder.)

Case XXIX.—Adult female; ingrowing toe-nail. Mixture administered for five minutes, during which time the operation for extirpation of the nail proceeded satisfactorily, when clonic movements of the extremities and manifestations of excitation set in. The operation was successfully concluded, and although consciousness was absent, the movements suggested the sensation of pain.

Case XXX.—A. W., male, aged eighteen years; severe contusion of the elbow. Mixture administered at first for fifteen seconds without, then for three minutes with pressure, for the purpose of using massage and passive motion. No pain was experienced, but slight tonic spasm was manifest in the muscles of the arm during the anæsthesia.

Case XXXI.—V. P., female, aged twenty-two years, of very excitable disposition; suppurative axillary lymphadenitis. The mixture administered for two minutes and forty seconds under pressure before operation; then for three minutes and twenty seconds, or for six minutes in all. Incision and drainage of the abscess. Loss of consciousness complete; no cyanosis; but muscular rigidity present all the time. On awakening the patient lapsed into a hysterical condition, screamed, and was much excited. Vomiting also occurred.

Case XXXII.—L. J., female, aged twenty-four years; was present during the foregoing operation, and much excited and frightened in consequence; suppurating mastitis. Mixture administered with pressure for five minutes and ten seconds in all. Remained partly conscious; muscular rigidity marked. Substitution of pure nitrogen monoxide; but patient could not be brought entirely under its influence.

There are, furthermore, some cases in which the action of the mixture under pressure were entirely unsatisfactory.

Case XXXIII.—Male, aged thirty years; fistula-in-ano. Mixture given first without, then with pressure; but the patient could not be got under its influence. Pure nitrogen monoxide was then substituted, but

with no better result, and asphyxia occurring with convulsions, the operation was abandoned.

CASE XXXIV.—B. S., male, aged thirty-one years; abscess of the hand. Mixture given under pressure. Incision of abscess. On removal of the inhaler a brief period of excitation of a maniacal character ensued, during which the patient uttered loud cries, walked across the room, and seated himself in a chair. On questioning, he afterward stated he had felt much pain. This patient was of a highly nervous temperament, but very muscular and robust.

CASE XXXV.—Adult man, with large growth of beard; fistula-in-ano. Mixture given under pressure but failed in its effect. Pure nitrogen monoxide substituted; but even with this the patient could not be anæsthetized. Great muscular spasm supervened and the operation, consisting in actual cauterization of the fissure and removal of hæmorrhoidal cicatricial excrescences, could be completed only with difficulty.

CASE XXXVI.—In still another case, that of an Italian, aged eighteen years, the mixture as well as the nitrogen monoxide failed to have the desired anæsthetic effect, but no mention is made in my notes as to the cause of the failure.

In reviewing all these cases where the mixture of oxygen and nitrogen monoxide was given under pressure, we must first consider those cases in which the anæsthetic failed to act satisfactorily.

These cases may be arranged in four groups or categories.

The first group comprises those patients who manifest extreme nervousness and excitability of temperament before they are given the mixture. There appears to be some element in the mental condition of these patients which counteracts the sedative influence of the mixture.

We know that certain medicines act differently upon persons of different temperament and idiosyncrasies; and that pain is largely dependent for its subjective appreciation on the attention. So, in order that a mixture of oxygen and nitrogen monoxide should induce perfect anæsthesia, the patient should be at his ease and not in an excited or frightened state of mind.

In the case of a woman, who had taken the mixture with good anæsthetic effect a day or two before, the administration of the same mixture utterly failed, because she had been frightened by the screams of another woman while under an anæsthetic during an operation preceding hers.

Closely allied to this first group of patients is a second, comprising those patients that look forward to an operation about the genital organs or the rectum. I know not why it is that this class of patients should be more difficult to anæsthetize than others. I have often observed, however, that such patients take ether and chloroform far worse than patients expecting operations on other parts of their bodies; and I believe the fact that operations upon the rectum or the genital organs are more dreaded than those on other parts will explain the matter.

A third group comprises those patients who have a heavy growth of

beard. This interferes with the close fitting of the inhaler to the face, and consequently air is admitted into the lungs along with the mixture. The patient cannot, therefore, be considered to breathe the mixture as it is prepared, and the desired effect is lost.

Perhaps it may be possible, by moistening the beard with water or in some other manner, to exclude atmospheric air in these cases.

A last group is represented by a number of persons, upon whom the mixture as well as the pure nitrogen monoxide has no sedative effect at all, or at any time, quite independently of their momentary mental condition. Every practitioner or dentist who has had occasion to use nitrogen monoxide in a large number of cases, has met with patients who cannot be brought under the influence of the gas at all. Generally they become more and more excited as the gas is inhaled by them, and acute maniacal attacks are sometimes observed, during which they utter howls and shrieks and make violent muscular exertions—oftentimes of an aggressive nature, and increased by restraint. Such conditions are comparatively rare, occurring in my own experience in about two per cent. of the cases, and always pass over rapidly without any detriment.

I ascribe the cause of failure in this group to habit. For I believe this condition stands in some relation to chronic alcoholism; and judging by the difficulty we experience in bringing patients used to drinking large quantities of alcohol under the influence of chloroform and ether, I suspect a similar cause in these cases.

We therefore find the field for the administration of mixtures of nitrogen monoxide and oxygen considerably narrowed down, and are obliged to rule out, as unsuitable, quite an appreciable percentage of all the cases we may be called upon to treat.

In the majority of cases, however, in young, healthy individuals and in females, the anæsthetic mixture when administered under pressure was found to work well and to be much superior to the pure nitrogen monoxide for surgical purposes. It induces a state resembling a quiet deep sleep, in which the respiration is slow and regular, the pulse regular and full and not much, if ever, increased in frequency. The blood-pressure is not increased; and insensibility to pain and unconsciousness go hand-in-hand.

It was my fortune to meet with a class of patients, as far as the foregoing observations are concerned, who were not sufficiently intelligent to observe their own feelings with any accuracy, or to inspire the confidence of others in their statements. It is one of the characteristic features of the nitrogen monoxide that while it induces unconsciousness to the surroundings it does not interfere with the activity of the memory and imagination.

The mixtures cause the patients under their influence to sleep, but also to dream, and more or less vividly—and some, on awakening are

apt to mistake their dreams for reality. Under these conditions it is difficult to know whether, when a patient says he felt an incision, he actually has remembrance of pain felt at the time, or whether the pain still present in the wound on the rapid awakening of the patient is not mistaken for the pain of the operation. For this reason I think it advisable to continue the anæsthetic for some time after the operation is completed, especially when nerve-trunks have been severed.

This rapid recovery after administration of the mixture under pressure is not so marked as when no pressure is used; the longer time the pressure has been used, the more time is required for recovery. In any case, however, according to my own experience, the interval of time between the removal of the inhaler and the recovery of the patient is too brief to admit of the satisfactory use of the mixture, even with pressure, for the extraction of teeth. The pure nitrogen monoxide allows the dentist more time to work in, during the slower recovery of his patient out of his asphyxiated condition.

Some writers are fearful lest by keeping the mixture of oxygen and nitrogen monoxide under pressure in the steel cylinders, a higher oxidation of the nitrogen should occur, and nitrogen dioxide or other poisonous compounds be produced. As far as my experience reaches, I have seen no occasion for any apprehension, although I have given this question special clinical attention.

The contents of the cylinders procured from the company mentioned above appeared to act equally well whether they had been freshly prepared or kept on hand or stored for some time.

Some variation was observed, however, between the action of the first of the mixture escaping from the cylinder and that of the last. On opening the cylinder for the first time, the gas mixture contains more oxygen than the rest of the gas.

The first bagful is therefore not used at all, while the last two or three bagfuls of a cylinder act much the same as pure nitrogen monoxide, and should be given without pressure. The appearance of cyanosis in a patient under the influence of the mixture is a sign that the supply is giving out.

The large cylinder, holding three hundred and twenty and more gallons of gas, proved more satisfactory than the small ones, holding but forty; although they are less convenient for transportation.

In conclusion, I may say, then, that we have in the ten per cent. mixture of oxygen and nitrogen monoxide, an anæsthetic which may be administered with perfect safety and for a sufficiently long time to permit of the circumspect performance of most minor operations, but one which may be characterized as a weak anæsthetic. For although it will plunge the average adult into a state resembling peaceful slumber, in which anæsthesia and unconsciousness are well marked, it cannot gain

the victory over states of great nervous excitement or dread, or certain habits and idiosyncrasies.

The anæsthetic action of the mixture is attained by administering it under pressure; and its usefulness is properly limited to the sphere of minor surgery in such cases where other anæsthetics are contraindicated or not desired, or where the saving of time is of great importance.

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THE ETIOLOGY OF EMPYEMA IN CHILDREN:

AN EXPERIMENTAL AND CLINICAL STUDY.

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(Concluded from p 50.)

Experiments upon Animals.

Rabbits, diplococcus pneumoniæ.

1. Medium-sized, white rabbit, injected in pleural cavity, with a pure culture in bouillon of the diplococcus pneumoniæ; died in eighteen hours.

Autopsy.—Rigor mortis marked; chest on both sides showed pleurisy of a sero-fibrinous character; fibrin of a greenish-yellow tint; serum more abundant in left chest. Pericardium: pericarditis, with slight amount of fibrin. Peritoneum: a slightly increased serum; no fibrin; no evidence of inflammation. Blood gave upon culture and stain diplococcus pneumoniæ (pure). Pleuritic fluid, diplococcus pneumoniæ pure culture.

2. Black rabbit (small). Inoculated March 17th; killed by medulla while dying, March 21st. Injected pure culture diplococcus pneumoniæ in chest.

Autopsy.—Sero-fibrinous pleurisy, double sero-fibrinous pericarditis. Peritonitis, sero-fibrinous exudate. Spleen large and swollen. Blood and pericardial fluid pure culture diplococcus pneumoniæ.

3. Small white rabbit; injected about ten minims bouillon culture in chest of diplococcus, March 18th.

Autopsy, March 22.—Beginning rigor mortis. Slight pleuritis; very little serum and fibrin in pleuritic cavity. Sero-fibrinous exudate in peritoneal cavity (peritonitis). Spleen not very large. Blood gave pure culture diplococcus in agar and bouillon, no growth in gelatin, and found also by stain. Lung juice crude cover-glass gave exquisite capsule diplococci.

4. Rabbit, medium sized, injected with pure bouillon culture diplococcus pneumoniæ; died instantly; failure of injection.

5. Rabbit, medium sized; injected in chest same as 4; died on the fourth day.

Autopsy.—Pleuritis double sero-fibrinous; very severe. Pericarditis sero-fibrinous, pericarditis marked. Spleen large and soft. No peritonitis; no meningitis. Specimens of blood, pleuritic and pericardial fluid inoculated on agar, gelatin, bouillon, etc.; reaction by stain and culture of diplococccus pneumoniæ.

6. Rabbit, medium size, injected in chest with pure culture of diplococcus pneumoniæ; died in six days.

Autopsy.—Double sero-fibrinous pleurisy. Pericarditis sero-fibrinous. Peritonitis sero-fibrinous. Spleen large. Cultures made from blood and pericardial fluid; diplococcus pneumoniæ.

7. Rabbit, medium size, injected subcutaneously with pure culture of diplococcus pneumoniæ; no result.

8. Rabbit, black and white spotted, medium size; injected in chest with five minims of empyema pus in which diplococci pneumoniæ existed; animal died in thirty-six hours.

Autopsy.—Forty-eight hours after injection. Rigor mortis marked. Pleurisy slight; some fibrin in the left side at point where needle entered the lung. Peritonitis very marked with sero-fibrinous exudate; brownish serum in bottom peritoneal cavity. Cultures from peritoneum and pleura, pure culture diplococcus pneumoniæ.

9. Small, active rabbit, injected with pure culture diplococcus pneumoniæ obtained from animal 8.

Autopsy made before rigor mortis. Pleurisy marked; sero-fibrinous exudate on both sides. Pericarditis with adhesions; sero-fibrinous exudate. Spleen large. Peritonitis marked; sero-fibrinous exudate. Pure cultures of diplococcus pneumoniæ obtained from pleura, pericardium and blood.

10. Rabbit, medium-sized animal, injected with peritoneal fluid of animal 9; died in two days.

Autopsy.—Four hours post-mortem. Pleurisy left sero-fibrinous. Pericarditis slight. Peritonitis marked. Spleen enlarged. Cultures show diplococcus pneumoniæ.

11. Rabbit, large white doe, injected with twenty minims of peritoneal fluid of rabbit 10, in each lung ten minims; killed by medulla on seventh day in dying condition.

Autopsy.—Marked sero-fibrinous pleurisy on both sides and also pericarditis. Spleen large.

12. Rabbit, small-sized, lively animal; injected with peritoneal fluid of rabbit 8; first two days considerable dyspnœa, but recovered and was apparently well. Killed after a week; the only thing found were a few delicate adhesions between the coils of intestine; some clear fluid in bottom of peritoneal cavity.

13. Rabbit, medium-sized; pure culture injection; killed after fifth day.

Autopsy showed marked sero-fibrinous pleurisy; marked sero-fibrinous pericarditis, also advanced peritonitis, with sero-fibrinous exudate. Large spleen. Pure culture of diplococci obtained from blood, pleuritic and pericardial fluid.

14. Rabbit; died with a paralysis of posterior extremities; exhaustion; remains of an old pleurisy found; adhesions of the costal and pulmonary pleuræ. This animal was injected in the pleura with pure culture streptococcus pyogenes.

15. Rabbit; injected with pure culture streptococcus pyogenes in pleural cavity from Case XI.; died after two days.

Autopsy.—Kidneys larger than normal and congested, but the spleen was enormous in size. Cultures of blood gave streptococci.

16. Rabbit; subcutaneous injection streptococcus pyogenes (pure); death after three days.

Autopsy.—Jaundice, universal, of all tissues. Lungs contained small abscess in lower right lobe. Heart, normal. Liver, very small abscesses, studded throughout. Kidneys, cloudy swelling. Spleen much enlarged. Urine, bile pigment.

17. Rabbit; injected with pure culture streptococcus pyogenes, with no result; lived for months.

In addition to the above experiments, there were some injections into guinea-pigs of the diplococcus pneumoniæ; these resulted negatively, except one animal which had been injected with pleuritic fluid from a rabbit that had died in its turn from an injection of diplococcus. In this there were typical pleurisy, pericarditis, and peritonitis, with large spleen.

A few injections upon rats and mice subcutaneously resulted in case of diplococcus positively in one case. Injections into additional rabbits with pus obtained from a tubercular case gave nothing worthy of note.

Cases.

Case I.—Y. S., aged seven years, admitted into hospital. Mother has had phthisis; child has had measles, four years ago, since then a slight cough. Became sick suddenly two weeks ago; has been ill since with cough, pain in the side, chilly sensations, dyspnœa.

Physical signs (left side). Flatness from mid-scapula down. Bronchial voice and breathing (at middle scapula), below distant breathing. Signs of bronchitis on both sides; no signs of phthisis in front or on opposite side.

Operation eighth rib, resected in the post-axillary line; abscess was found to be higher up and encapsulated; adhesions had to be broken down in order to reach empyema. Examination of pus: crude cover and cultivation; streptococcus pyogenes. Cured.

Case II.—R. T., male, aged eight years; January 1st. Family history negative. He had scarlet fever four years ago; a year ago had a bronchitis; a month ago also bronchitis (?). Two weeks ago had fever, temperature 104° (physician). Complained of headache; next day had pain in the left side; dyspnœa; slight cough; no expectoration; temperature 103°. During the next week the temperature did not exceed 101.5°.

Admission to hospital, showed marked œdema of skin of left side, but on incision later (at operation) no infiltration of pus was seen; signs of fluid in left side.

January 2. Operation, resection as noted; there was no infiltration of the œdematous skin with pus. In spite of resection the lung would not expand.

January 3 *to February* 10. Temperature 100°, 101°, to 104°; pulse 110, 112, 138, to 152; respiration 32, 44, to 52. The boy did badly; there was a profuse discharge of pus, fetid in odor at each dressing, and lung did not expand. Several resections were performed upon this chest to favor retraction of chest toward lung and closure of the large cavity in the chest. There resulted much deformity, and at discharge from hospital there existed a discharging fistula.

Bacterioscopic results were limited to stainings of cover-glass specimens of pus and showed tubercle bacilli. Animal experiments negative.

Case III.—I. S., aged two years; male; February 18, 1890. Has had measles, a year ago; inflammation (?) of the lungs ten months ago; present illness began with fever six weeks ago; this fever after a few days was complicated by convulsions recurring at intervals. Cough

was very marked and present during the entire illness; there was loss of flesh and strength, and increasing pallor.

Admission to hospital showed a weakly child, badly nourished, pale; temperature 100°; respirations 40; pulse 120. Physical signs of fluid in right side chest. Tenth rib exsected; about a pint of thick, green, tenacious pus evacuated.

Bacterioscopic result of examination, pus; diplococcus pneumoniæ (Fränkel and Weichselbaum).

May 11. Discharged cured.

CASE IV.—I. S., male, aged eleven months; has been sick for three weeks with fever, cough, dyspnœa, emaciation. Signs of fluid in right pleural cavity. Dulness to flatness. Loss of movement. Loss of fremitus. Loss of voice; pleuritic râles over whole side; syringeful yellow, thick pus removed.

Bacterioscopic examination. Staphylococcus pyogenes aureus. Result unknown.

CASE V.—P. M., male, aged two and a half years; March 3, 1890. Previous history negative. Present illness began a month ago with fever, cough, difficulty in breathing, and constitutional disturbances; fever continued marked during the first two weeks, then abated, but continued nevertheless; pallor, loss of flesh and strength, and generally becoming worse.

Admission to hospital. Anæmic, poorly nourished, anorexia, cough. prostration, and fever; temperature 101°; respirations 46; pulse 104, Signs of fluid in the left side and areas of consolidation (broncho-pneumonia) over the right side. Heart apex just inside the middle line.

March 4. Turbid flocculent serum removed from the chest. Cultures show diplococcus pneumoniæ. Aspiration, only four fluidounces (serous) removed in all, but patient continued to grow worse, temperature varying from 101° to 104°; respirations from 50 to 70; pulse 148 to 160.

16*th*. Needle in left side withdrew a creamy pus.

18*th*. Resection of rib, and about one ounce of pus evacuated, but patient grew worse; died March 27th from broncho-pneumonia on both sides.

Examination (bacterioscopic) of pus withdrawn March 16th, showed diplococcus pneumoniæ.

CASE VI.—I. K., male, aged three and a half years; March 13, 1890. Family and personal history not lucid. Present illness began nine weeks ago with fever and cough and difficulty in breathing; prostration, loss of appetite; patient complained of pain in the left side; loss of flesh and strength; there were night-sweats; patient has steadily lost ground.

Admission to hospital. Poorly nourished, anæmic, delicately built lad; no sign of rhachitis; temperature 101°; respirations 40; pulse 132 (dyspnœa). Physical signs showed fluid in left side. Heart apex pushed to the right, and sounds most intense behind lower end of sternum; no signs of phthisis at apices.

March 16. Operated resection of eighth rib; greenish odorless pus, with large masses of fibrin evacuated, as big as a child's hand.

28*th*. Discharged cured.

Bacterioscopic examination of pus, diplococcus pneumoniæ.

CASE VII.—M. B., aged two years; male; March 1, 1890. Family and personal history negative. The previous history is indefinite; the patient for some time has suffered from cough. Present illness dates a

week back; contracted a severe cough, and dyspnœa became very marked; fever, night-sweats, loss of appetite.

On admission, patient is well nourished; suffers great dyspnœa, this symptom so marked as to give impression that œdema of the glottis was present, or obstruction in the larynx. Intubation attempted but failed, and tracheotomy performed. Temperature 100°. Examination of the chest revealed spots of broncho-pneumonia over both sides. March 5th to 15th, temperature 101° to 105°; respiration 40 to 76; pulse 140, with dyspnœa; increasing; attempts to remove tracheal tube resulted in renewed attacks of dyspnœa. March 15th, signs of fluid in left side of chest, and on March 16th, operated, and twelve ounces of pus, greenish, no bad odor, removed from left side. Eighth rib resected.

March 18. Discharged cured.

Bacterioscopic study and culture of pus revealed diplococcus pneumoniæ.

CASE VIII.—H. G., male, aged twelve years. Father, mother, and sisters and brothers in good health; previous history indefinite. It is not possible to obtain definite information as to the exact time of onset of present illness. He has for a few weeks past suffered from cough, fever, and night-sweats, pain in the right side upon coughing or taking deep inspiration; has been confined to his bed; no history of traumatism.

Admission to hospital. An anæmic but well-built lad, not at all emaciated. Physical examination revealed fluid, and needle withdrew pus in right side. Temperature 100°; respiration 40; pulse 140; resection of rib on right side and a pint of greenish fluid, not adhesive pus, removed; no fibrin clots were withdrawn; some adhesions between the costal and pulmonary pleuræ.

Bacterioscopic examination of pus revealed streptococcus pyogenes.

Result: Cure.

CASE IX.—Female, aged two and one fourth years. April 10, 1890. Family history shows nothing. Present illness began three weeks ago with some eruption (?) upon the body; about a week later there appeared a cough, fever, distress in stomach and abdomen.

Admission to hospital. Anæmic child, with signs of rhachitis, cough, dyspnœa, and some cyanosis; temperature 101°; pulse 160; respirations 48. Physical signs of fluid in the right side, pus withdrawn, immediate operation, exsection; sixteen ounces of pus evacuated. April 12th to 22d, temperature varied from 99° to 103°; respirations 40 to 43; pulse 130 to 158; on April 22d, symptoms pointing to an invasion of the healthy lung by broncho-pneumonia appeared, and patient died with all the symptoms of pneumonia and exhaustion.

Bacterioscopic examination of pus revealed diplococcus pneumoniæ (Fränkel and Weichselbaum).

CASE X.—M. G., male, aged four years; April 18th. Family and previous history negative. Present illness began seven weeks ago with scarlet fever; three weeks later the patient developed general anasarca, this lasted until eight days ago; at the same time he had a severe cough, chills, and fever; constant sweating, lasting until the date of admission; loss of flesh and strength, also failure of appetite and frequent micturition.

Admission to hospital. Patient anæmic and emaciated, cough and dyspnœa. Temperature 99°; respirations 42, and pulse 140. Signs of fluid in the left side. Heart apex pushed to the right of the sternum.

Operation, exsection of rib; twenty-nine and a half ounces of pus of creamy character evacuated.

Bacterioscopic examination revealed diplococcus pneumoniæ.

Result: recovery.

CASE XI.—Male child, aged four months. May 9, 1890. Had been perfectly well until two weeks ago, at this time child was vaccinated; simultaneously with the vaccination, there appeared a burrowing abscess on the dorsum of the left foot which was deep and passed between the metatarsal bones. Eight days ago a febrile movement appeared and the patient was referred by me to a surgeon for treatment. There were at this time no lung symptoms. Three days ago the child developed cough and dyspnœa.

Status præsens: There is cough, dyspnœa, sighing respiration; pulse increased in rapidity; temperature 103°; abscess on foot still present; vaccine pustule still size of five cent piece and angry-looking. Examination of left side revealed chest full of fluid and needle withdrew pus, light yellow, thin, easily separating into two layers, clear and serous, upper and lower purulent.

May 10. Exsection of rib; six ounces of pus (milky) evacuated.

12*th*. Died; no autopsy.

Bacterioscopic examination of pus revealed streptococcus pyogenes.

CASE XII.—*May*, 1890. Male, aged twelve months; well developed; has been suffering from pertussis and just recovered; about two weeks before date was doing well, when suddenly there appeared a new cough with dyspnœa, and broncho-pneumonia of the right lung was diagnosticated. The cough and fever and dyspnœa still continued up to May 9th, when fluid was found in the right side. A needle introduced about this time withdrew a clear serum; temperature 103°; pulse 160, and rapid respiration. Transferred to the hospital, where child next day showed a measles eruption.

13*th*. Needle introduced into right side and pus was withdrawn; child was doing well, but on the morning of the above date, patient suddenly developed tympanites (peritonitis (?)) and died.

Bacterioscopic examination of pus of May 13th and serum of May 9th revealed diplococcus pneumoniæ.

CASE XIII.—Empyema; perforation; spontaneous recovery. Female, aged thirteen months. May 12, 1890. Previous history negative. Child was taken ill about three weeks ago with cough, fever, dyspnœa. The child had dyspnœa, and moaned when it breathed; there was a frequent cough and a temperature of 103½°; pulse 160. Examination of chest showed consolidation of the left upper lobe (dulness, bronchial voice, and breathing). Diagnosis: broncho-pneumonia. The patient seemed to improve up to a week ago, when the temperature and cough persisted, the dulness behind became more marked and spread toward the base of the lung; fremitus absent; voice and breathing bronchial. Needle introduced and pus withdrawn from left side, greenish-yellow, adhesive; heart not displaced; operation advised.

August 1. Child had escaped from observation, and having refused operation passed under care of others. It was brought to me, August 1st, for diarrhœal trouble; chest showed no signs of old trouble; lung had expanded; voice and breathing good, no friction sounds. There was a slight dulness only left over the affected side; fremitus good; no fever; child looks much improved. Mother says that after leaving my

care the patient grew worse until she began to cough up large amounts of yellow matter (pus?). This continued some time at intervals; patient recovered; no cough.

Bacterioscopic examination of pus revealed diplococcus pneumoniæ.

CASE XIV.—*May* 13, 1890. L. H., aged eighteen months, male; previous history negative; father and mother well and in apparent good health. Nine days ago child developed a cough, fever and dyspnœa; the dyspnœa increased, fever continued, and there was restlessness at night. When brought to me the child was anæmic; had signs of rhachitis; there was much dyspnœa and moaning respiration, drowsiness, and partial stupor. Temperature 105°; pulse 165; respirations 56. Physical signs of fluid in right side below mid-scapula, needle introduced and a clear bloody serum obtained.

14*th*. Needle introduced, signs of fluid having increased, and withdrew milky pus.

15*th*. Exsection of rib, eight ounces of pus removed.

Bacterioscopic examination showed staphylococcus pyogenes aureus.

CASE XV.—D. H., male, aged five and a half years. Father and mother living, has had no special illness; present illness dates from October 6th, when there was fever and pain and dyspnœa; the pain was referred to the stomach; there was no distinct history of chill. When first seen, October 7th, patient was a well-developed child; no signs of past rhachitis; there was dyspnœa, a dry cough, fever; there was also some restlessness; complains of stomach pain. Temperature 103°; pulse 130; respirations increased. Signs in chest negative.

October 8. Temperature 104°; pulse 140; respirations rapid; pain in right side; rusty sputum. Diagnosis at this time: right lobar pneumonia lower lobe. At end of five days signs pointed to a resolution of an ordinary lobar pneumonia; temperature 102°.

19*th*. Signs of fluid in chest. The boy has not been doing well, and new signs appeared; loss of fremitus; flatness, bulging of right side; subcrepitant râles close to the ear, voice and breathing though coarse heard over whole chest; dyspnœa great; temperature 103½°; pulse 160; respirations rapid.

21*st*. Operation: simple opening in chest and tube inserted; about half a pint of pus evacuated; not fœtid; yellow color.

27*th*. Discharge fœtid and penetrating odor; the drainage bad and a resection was performed, November 5th. Final complete recovery.

Bacterioscopic examination of pus first taken from chest showed diplococcus pneumoniæ.

CLINICAL CLASSIFICATION.

The cases here recorded, from a clinical and bacteriological standpoint, divide themselves quite readily into groups.

GROUP I.—Here we can place those cases of empyema in which the bacterioscopic examination revealed the staphylococcus pyogenes aureus, or the streptococcus pyogenes. These microörganisms did not exist associated, but in so-called pure form and isolated in the exudate. The etiology of these cases is very difficult to make out, because this group does not include cases of empyema where an extraneous source of infection exists. Those cases of empyema in which the pleuritic exudate

shows simply the presence of the staphylococcus or streptococcus alone, and where there is no history of traumatism with perforation of the skin, or where there is no suppurating focus of infection outside the pleural cavity, are most puzzling to explain because the bacterioscopic finding gives us no clue as to the origin of the disease. The staphylococcus and streptococci are microörganisms which exist in suppurating processes of the most diverse nature and situation in the body. I have four such cases to place under this heading. One female, aged seven years, and three male children, aged eighteen months, two years, and twelve years respectively. In none of these cases was there a history of traumatism of any kind. When they came under observation, they had been ill with symptoms of pulmonary trouble for periods varying from one to six weeks.

Assuming that an infection of the pleura is most apt to result from adjacent inflammatory processes, the most usual disease preceding or complicating such a pleurisy is pneumonia. Weichselbaum has demonstrated that in addition to the pneumococcus of Fränkel, there exists in the lungs of pneumonic patients the streptococcus pneumoniæ (or pyogenes) and the staphylococcus pyogenes aureus. Though we cannot as yet yield to these microörganisms the dignified position of being the direct cause of pneumonia, we find that they exist in the lung constantly as so-called mixed infections, as they do in diphtheria. Thu[1] has argued that microörganisms in pneumonic fibrinous pleuritis and pericarditis (pneumococci) first find their way through the lymph channels into the subpleural tissue and then into the pulmonary pleura, and finally gain the surface of the pulmonary and costal pleura; from thence they may be carried into the mediastinal spaces and reach the tissue of the pericardium and even the muscular tissue overlying the costal pleura. It is true that the failure to find the pneumococcus in the exudate does not disprove the possibility that at some early stage of the empyema it might have been present; however the tendency to-day is to consider the active predisposing causes exposure to cold and moisture. It is thought that though the above microörganisms may exist in the air passages, as has been proven in the nose and mouth of a healthy individual, they may remain inert until, cold and wet reducing the resistant vitality of the organism, they cause an empyema; so a wound in the chest wall without perforation of the skin may exert a similar influence.

Group II.—The cases of empyema which fall under this group are the most interesting of all pleurisies. They are those which either complicate or follow a pneumonia. In the pleuritic exudate of such an empyema the diplococcus pneumoniæ (Fränkel and Weichselbaum) may be demonstrated as in all of my cases.

[1] Centralbl. f. bakteriol., 1889, Bd. v.

These were two female children, aged thirteen months and two and a quarter years respectively, and seven male children, aged twelve months, two years, two and a half years (two), three and a half years, four years, and five and a half years. They had been ill when they came under observation for periods ranging from one to nine weeks. In one case the patient had been under the observation, from the very beginning, of a skilful observer (Case XV.), and the diagnosis of lobar pneumonia followed by a pleurisy (empyema) was distinctly traced. As recorded elsewhere, the diplococcus pneumoniæ (Fränkel) could be easily recognized in the crude pus by spreading upon cover-glass; beautiful capsule appearances were also obtained. Pure cultures were isolated in every case and their virulence tested upon animals while the cultures were still recent. The experiments were in the direction of intra-pleural or pulmonary injections, so that appearances in the animal experiments resembled very much what is seen in the human subject. If such a pathogenic microörganism is found in a pleuritic exudate, it can be traced to only one probable source, the lung. It is scarcely necessary in any of these cases to prove clinically the existence of a pneumonia. If one will refer to the histories of the cases he will see that in some a pneumonia, either of the lobar or lobular type, must have been in active progress when the empyema was operated upon. At least the physical signs and symptoms indicated this condition of affairs in the lungs upon the opposite side to the empyema, if not in the lung corresponding to the empyema.

In one case, where the patient succumbed, the opposite lung was undoubtedly affected. In other cases, after operation, the temperature would not only persist, but persistent broncho-pneumonic processes were present; this was notably the history of Case III., who continued in the hospital for months, being finally discharged cured. In these cases, tuberculosis was excluded by all possible methods, both clinical and bacteriological. But in the majority of the cases in which the pneumococcus was found in the pus of the empyema, the evacuation of the pus marked the abatement of all symptoms and recovery of the patient, showing that the pneumonia, if it existed, had preceded the accumulation in the chest and had passed through its various stages. The pneumococcus has been found by Weichselbaum in lungs the seat of lobular pneumonia, as well as in those the seat of lobar process.

I have elsewhere described the macroscopic characters of the pleural exudates in the cases of empyema belonging to this group. But in two the pleuritic fluid when first withdrawn from the chest was serous in character, in one case even devoid of flocculi. In both of these cases, the exudate taken later with an exploring syringe was markedly purulent, and both cases were operated upon. In the serous fluids first obtained, as also in the purulent exudate, the diplococcus was found.

This shows distinctly that though an exudate may be serous at first, it may subsequently become markedly purulent, not on account of anything introduced into the chest on the occasion of the first puncture, but from the continued action of microörganisms already present (diplococcus pneumoniæ or streptococcus pyogenes, Fränkel). Again, pus from the chest has a tendency, without this cavity, to separate into strata, the upper one being serous and containing but few leucocytes; we may aspirate this stratum in a marked empyema, and thus can not draw any definite conclusion as to the nature of the exudate. If an exudate contain streptococci, even though serous, we can with certainty predict the advent of pus (Fränkel). We might make a similar assertion of fluids containing the diplococcus pneumoniæ. If a serous fluid withdrawn from the chest fails to reveal any microörganisms upon stain or culture, we can conclude that there is a probable tubercular element in the pleurisy (Fränkel). If such a serous exudate subsequently shows the presence of microörganisms (streptococci) and then becomes purulent, we can suspect contamination. With conscientious cleansing of a needle-syringe, we may fearlessly enter the pleural cavity without having in the least compromised the health of the patient. I am certain much misunderstanding has arisen on this subject through a misinterpretation of the real nature of some of these serous exudates. While some are devoid of microörganisms (tubercular), others are filled with pyogenic microbes, capable not only of producing suppuration, but maintaining it.

Group III.—This group, which includes empyema of tubercular nature, is most unsatisfactory in its various aspects. Fränkel, who spent much time and patience upon tubercular pleurisies in the adult, found cases in which examination of the exudate yielded a negative result. So common was this, that he concluded that a negative finding was much in favor of the tubercular character of the exudate. These exudates may be localized or involve the whole pleura. They may or may not be accompanied by lung areas of tuberculosis; in cases where the lung is involved, in the adult, the tubercle bacilli may be found in the sputum, but in children the examination of the sputum is not always practicable. If, as in children, the lung shows no positive involvement and the examination of the exudate is negative, diagnosis and prognosis are difficult. Ehrlich (*Charité Annales*, 1888) explains the absence of tubercle bacilli in two ways: 1. The fibrin formations in the exudate remove the bacilli by enclosing them. 2. Thickening of the pleura by adhesions causes a resistance to the transmigration of bacilli. In empyema, the bacilli are more numerous than in simple pleuritic exudates, because cells passing in myriads into the exudate are more apt to carry bacilli with them. Israel and Gerhart think that the bacilli rather become entrapped in the miliary growths of the pleura, and thus do not pass into the exudate.

I have but one case to place in this group, that of Case II., a boy of eight years, who had had several bronchitic attacks years before the advent of his empyema. The exudate had to be repeatedly examined in order to establish the presence of tubercle bacilli (stained by Ehrlich's method), but the experiments with animals were of a negative character. In this case the streptococcus pyogenes was also found in the exudate from the very first; this is similar to a case in the adult recorded by Fränkel. The formation of adhesions tying down the lung must have been exceedingly great, for operation found the lung unable to expand and repeated exsection of the rib had to be resorted to, in order to obtain partial closure of an immense suppurating cavity. The deformity resulting was most pronounced. I have made attempts in other children and this boy to obtain sputa for examination, but have not succeeded. I attributed my ill success in inoculation upon animals to the presence of contamination in the pus.

Thus, my group of tubercular empyema remains unsatisfactory, though diagnosticated with a certainty from the presence of tubercle bacilli in the exudate. The lungs upon examination yielded no evidences of involvement.

Group IV.—In this group we might class those cases of empyema in which some focus of suppuration situated in another part of the body may be with great probability pointed to as a source of infection. The infecting focus may be adjacent, as in the cases of Fränkel, where a retro-pharyngeal abscess or perforating peritonitis were the cause of the empyema, or the empyema may be one of the manifestations of a species of pyæmia (as in my own case). This was a male infant, aged four months, who was perfectly well up to within two weeks of its death. The infant was vaccinated and then developed a burrowing abscess of the foot, and after this the empyema appeared. No autopsy was allowed; it would have been interesting to see (though no pneumococcus was found in the exudate of the pleura) whether a pneumonia (pyæmic) was present with the empyema. The rapid death of the child speaks in favor of some virulent infection; an autopsy might have revealed several other hidden foci of suppuration.

The bacterioscopic finding and experiments in the above case are interesting. The streptococcus which was isolated and existed alone in the exudate was certainly very virulent. Two animals injected with a pure culture (15 and 16), both died. Both were injected at the same time with the same culture; the one in the pleural cavity, in this case, the animal died in two days; streptococci were found in the blood and organs, but there were no inflammatory exudates; the kidneys were swollen and the spleen was enormous in size. The second animal was injected subcutaneously, and the report of the autopsy shows metastatic abscesses all over the body with general jaundice and enlarged spleen

and cloudy kidneys. These results differ widely from those with streptococci obtained from cases of Group I. Here the animals survived and autopsies after months showed no effects of infection, or as in rabbit 14, only the effects of local processes limited in nature.

Putrid Empyema.

By this I desire to designate those cases of empyema in which there was a putrid or fetid odor to the discharge, and in which this odor persisted.

In both of my cases the exudate turned putrid after operation. In one (XV.) the empyema followed a pneumonia, and in the fluid first withdrawn from the chest, the pneumococcus alone existed. In this case, on account of the imperfection of drainage due to the first mode of operating, there was retention of pus, the chest wound finally closed, and when reopened again for resection, the pus was very putrid.

The second case was that in which the pus showed the presence of tubercle bacilli. There was no odor to the pus upon the first resection. But there was not only lack of any expansion in the lung, leaving an immense cavity in the chest, but the pus remained in this cavity. Here the empyema became putrid, necessitating repeated washings of the chest with creolin solution. In spite of this fact, the pus remained putrid. Investigation succeeded in revealing the presence of a fluorescent green bacillus, rather thick and short, which fluidified gelatin (much like that found in water) and grew upon agar of Weichselbaum in a dark-green layer with a rather mawkish odor to the growth. This is all that could be found in addition to the tubercle bacillus and streptococcus previously present. This shows that the most innocent exudate may turn putrid, as in the case of pneumonic empyema, as well as the tubercular cases. It seems rational to suppose that lack of expansion of the lung or retention of pus, especially where the chest has been injected with so-called antiseptic solutions (in the above cases boric acid or creolin), are conditions peculiarly favorable to the development of putrid exudates. I have seen air enter daily freely into the chest cavity without causing the pus to become putrid; also the introduction of bacteria from the lips of the wound was unavoidable, on account of the free moving of drainage-tubes and dressings and tampons over the mouth of the external wound. Yet drainage being free, with full lung expansion, no putridity appeared. In the future, the appearance of a putrid exudate in a chest in which primarily the pus possessed no such characters, would make me think of retention due either to insufficient drainage or want of proper expansion of the lung.

Prognosis.—We can safely say that the present status of our knowledge in these cases enables us to assure our patients with moderate certainty as to the outcome of the illness of their children. Such

prognosis may be made at the bedside or within a very short period from the first examination of a case. The simple means at the disposal of every clinician are adequate for the examination of crude specimens of pus, and delay of a day or two at the most is all that may be necessary for more deliberate investigation. Nor do I think that we should take too much credit to ourselves for the recovery of a certain class of these cases which, under proper guidance, invariably get well. Thus, it would appear that the best prognosis is held out to those which belong to Groups I. and II. More especially is this true of cases of meta-pneumonic empyema. In one of these (XIII.), in which the purulent exudate filled the chest and was withdrawn from the same by exploring needle and contained pneumococci, the patient recovered; having refused operation, the empyema perforated the lung and thus gained exit externally, pus being coughed up. Subsequent examination of this case revealed nothing abnormal on the diseased side but slight dulness. The lung had thoroughly expanded. Fränkel records similar cases in the adult. It would scarcely be well to expect too much from such *laissez faire* treatment, for a large percentage (Ziemssen's *Vorträge*) of cases which are allowed to perforate die. The age of the patient and the presence or absence of any considerable pneumonia will weigh in each case. Some authors are enthusiasts for the simple opening and drain in the chest; others insist on the trial of repeated aspiration; others contend that resection of the rib is the only safety of the patient and secures a rapid expansion of the lung. The truth lies in the etiology of the cases of empyema. In the meta-pneumonic exudates cases will do equally well by the various modes of treatment; in other words, the pus evacuated by whatever means, there is an inherent tendency to absorption of what inflammatory product there is remaining and return to a normal status, as in the pneumonic lung.

The pneumonic exudates, if they hold out such brilliant prospect of recovery to the patient, are a striking contrast to the tubercular cases, where only a partial recovery is at best possible. There are cases on record where, especially in children, an empyema (Ziemssen's *Vorträge*) of established tubercular nature has made an apparently good recovery, yet we must doubt its permanency. We cannot rid ourselves of the idea that a large extent of surface like the pleura, once tubercular, must, if recovery takes place, be a latent danger to the patient.[1] In other cases, the recovery results with fistulæ, retraction, and all the concomitants of permanently crippled respiratory apparatus. The pyæmic cases are fatal as far as we know.[2]

[1] Klesch and Vaillard (Arch. de Physiol. et Path., 1886) have made autopsies upon pleurisies of a tubercular character which had apparently recovered, and were able to prove their tubercular nature at autopsy.

[2] I desire to express my sincere obligations to Dr. Barium Scharlau, of the Mount Sinai Hospital, for the clinical material which he so kindly placed at my disposal.

A REMARKABLE CASE OF SKIN DISEASE.

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Reported by W. C. Sandford, M.D.,
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The case which we are to consider is unique, not alone in the fact that the shedding of the cuticle and nails of the hands and feet was complete, but in its repetition for thirty-three consecutive years, on the same day of the month, and within a few hours of the same time of the day.

In a research in medical literature, in which we were kindly assisted by Dr. James S. Newburgh, we failed to find a parallel case; cases have been reported where the shedding was complete, but none which recurred at regular intervals.

The patient, John H. P., of Phillipsburg, Montana, called upon Dr. J. Frank, July 22, 1890, with a letter of introduction. Dr. Frank referred him to the St. Elizabeth Hospital, where he was admitted as a private patient on July 23, 1890. While here, the patient was seen by a number of prominent dermatologists of this city, and was studied with special interest by Drs. James Nevins Hyde, McArthur, J. S. Newburgh, and F. H. Montgomery.

The patient, a miner by occupation, has been exposed to all the hardships of camp life, but has borne them with ease, being well formed, and apparently in perfect health. Height 5 feet 9½ inches, weight 150 pounds, eyes dark, hair dark-brown, full set of natural teeth, special senses all normal, intelligence good, skin perfectly normal. No birthmarks were to be found.

His history, as given by himself, is briefly as follows: Father and mother both living; father sixty-eight years, mother sixty-one years. Maternal grandmother living, and in her ninety-seventh year. The patient is the second of a family of thirteen children, all of whom are living and in good health. Has never had any of the eruptive fevers, and has never required the attendance of a physician. Had two light attacks of gonorrhœa, and was salivated once by the breaking of a mercury retort, but took no treatment for either.

He was born December 29, 1857, during the Kansas and Missouri trouble. His mother was driven at night from her home in Franklin to the Meredenson River, four miles distant, where she was confined in the open woods, with no attendant but her mother. Mother and child were taken to shelter the following day. As there was nothing peculiar occurred during her pregnancy or confinement, the woman cannot account for the skin shedding of her child which took place later.

On the 24th of July following his birth he was suddenly taken ill—vomited, became hot and feverish, and in a few hours the entire surface of the body was scarlet-red. Symptoms increased for three or four hours, when they gradually subsided, and the patient was supposed to have recovered; but on the fourth or fifth day following the attack the entire

cuticle was cast off, and a few days later the nails of his hands and feet were also shed. This was repeated each year on the same date. His mother took no notice of it at first, thinking it was one of the eruptive fevers. When he was seven years old he was taken to a physician in Denver, who kept him under observation for a time, but gave no treatment. He has never been attended by a physician except from curiosity.

The patient first remembers the shedding in 1865, when the cuticle and nails were cast off while at play. These attacks have been repeated each year on the 24th of July, usually at 3 P.M., and never later than 9 P.M.

The paroxysm begins abruptly. Patient has a feeling of lassitude and weakness of fifteen to twenty minutes duration, followed by muscular tremors, nausea and vomiting, a rapid rise of temperature, skin and mucous membrane of tongue and mouth become red and inflamed, and are hot and dry. No perspiration appears after the paroxysm begins until the cuticle is cast off.

The acute symptoms begin to subside in from three to four hours, and are entirely gone by the end of twelve hours, with the exception of the redness of the skin which does not return to its normal color for thirty-six hours more. The patient has been delirious three times during these attacks, once for nine days.

In his early life the cuticle began to be shed on the second or third day after symptoms appeared, and was complete by the fifth day; but each succeeding year it takes a little longer, until now it is ten or twelve days before shedding is complete. The cuticle can be detached in large sheets, and he has always been able to remove it from the hands and feet in one piece in the form of gloves and moccasins.

The nails are loosened and crowded off in about four weeks after the acute stage.

On the 24th of July, the day following his admission into the hospital, the above symptoms occurred with marked similarity.

By invitation from Dr. J. Frank, a number of physicians were present during the acute stage. Among them were Drs. R. N. Hall, J. K. Bartholomew, H. M. Luken, L. A. Beard, Archibald Church, and W. F. Coleman. At 2.45 P.M. the patient was seen by Dr. Luken and myself. He was apparently well, but assured us he would soon be sick.

3 P.M. Was still walking in the hall. Very nervous, and had a peculiar, anxious expression.

3.15 P.M. Retired to his room. Nervousness increasing; slight muscular tremors; hands, wrists, and neck beginning to get red.

3.30 P.M. His entire trunk, and arms down to the elbows, bright scarlet-red, resembling the appearance of a scarlet-fever patient, but cuticle is not elevated.

3.50 P.M. Nausea; trembling over whole body; redness extended down to the great trochanters; mucous membrane of tongue and mouth also congested.

3.55 P.M. Vomited two drachms of thick tenacious mucous, streaked with blood. Was given a glass of warm water and a teaspoonful of syr. ipecac.

4.05 P.M. Pulse 68; temperature 97° F.; slight flush over limbs, more noticeable over left. He claimed to get an electric shock when the skin

was touched. This was probably due to a hyperæsthetic condition of his skin.

4.10 P. M. Nausea, and attempt to vomit. The nausea subsides between paroxysms of vomiting, and patient converses intelligently. Right lower limb as red as trunk; left beginning to flush. Tongue and mucous membrane of mouth very red. Trembles greatly; cannot carry glass to lips. Given two glasses of warm water and a drachm of syr. ipecac.

4.15 P. M. Redness shows through the soles of his feet, giving them a yellowish-red appearance. Skin has a warm, greasy feeling. Perspires only under eyes and on forehead.

4.20 P. M. Left limb nearly as scarlet as trunk.

4.25 P. M. Vomited one pint of water and mucus.

4.30 P. M. Pulse 68; temperature 99.6° F.

4.50 P. M. All the body, excepting the forehead and beneath the eyes, scarlet-red, showing distinctly in the palms of the hands and soles of the feet.

5 P. M. Pulse 76; temperature 99.4° F. Vomited a small amount of mucus.

5.5 P. M. Nausea and acute pain. Given a glass of warm water. Trembled so he could scarcely carry glass to lips. Vomited immediately after taking water.

5.30 P. M. Pulse 76; temperature 99.3° F.

5.45 P. M. Vomited four drachms of thick gray mucus with extreme pain. Bowels moved; stool light-colored.

6 P. M. Pulse 76; temperature 99.3° F. Surface of body warm, but patient complains of being cold.

6.30 P. M. Pulse 88; temperature 101.2° F. Resting quietly. Took a light supper.

7.35 P. M. Pulse 92; temperature 101.4° F.

8.30 P. M. Pulse 92; temperature 102° F.

8.45 P. M. Given ten grains of antipyrine.

9.30 P. M. Pulse 88; temperature 103° F. Nausea and an attempt to vomit. Symptoms soon subsided. Patient rested quietly from 10 P. M. until 7 A. M. the following morning, sleeping most of the time.

10.30 P. M. Pulse 80; temperature 100° F.

11.30 P. M. Pulse 80; temperature 100° F.

25*th*, 12.30 A. M. Pulse 84; temperature 101.7° F. Given 10 grains of antipyrine.

2 A. M. Pulse 80; temperature 101.4° F.

5 A. M. Pulse 88; temperature 101.2° F.

7 A. M. Pulse 84; temperature 100.5° F. Still drowsy. Has a slight headache.

9 A. M. Pulse 80; temperature 99.8° F.

8 P. M. Pulse 84; temperature 101.5° F.

26*th*, 8 A. M. Pulse 84; temperature 99.5° F. Cuticle beginning to scale on scrotum.

8 P. M. Temperature normal. Skin has assumed its normal color. Redness faded in the same order as it appeared.

27*th*. The epidermis of the mucous membrane of the tongue and mouth came off. Tongue resembled a typhoid tongue after it has cleaned up.

28*th*. Perspires freely from forehead and under eyes. Cuticle over chest raised up in the form of blisters by the perspiration.

30*th*. Cuticle removed from trunk and arms to wrists.
August 1. Cuticle detached from lower limbs to ankles.
2*d*. Skin taken from right hand in the form of a glove.
3*d*. Left glove removed. Skin also loose on upper surface of feet; soles still intact.
9*th*. Right moccasin removed.
11*th*. Left moccasin removed.
After the removal of the cuticle the skin was very soft and delicate, resembling that of a child.
Where the cuticle was thick, as on the palms of the hands and soles of the feet, the new skin was very sensitive, and to protect the feet he wore the moccasins for several days after they had been removed.

At the time of the dismissal of the patient from the hospital, August 15, 1890, it could plainly be seen that the nails would soon be cast off.

New ones were forming at their bases, and the old ones were loosening from the sides and underneath. A thin, blunt instrument could be passed beneath them to their bases without causing pain. Previous to leaving for his home a piece of integument was removed, under cocaine, from his arm, and a careful microscopical examination did not reveal anything abnormal.

Under date of August 29, 1890, Mr. J. P. writes the following: "I arrived at Black Pines the evening of August 22d, went to work that evening, and continued until the following evening. Am in perfect

health. Enclosed find nails from little finger and second finger of right hand, detached August 26th. Will send the remaining nails in a few days."

September 19th I received another letter containing seven more nails. They were from the little finger and second and third fingers of left hand, detached September 2d; both thumb-nails removed September 5th; and the nails from the big toes, which were the last to come off, on September 8th.

The remaining nails became so broken while at work that they were useless as specimens.

ASEPTIC AND ANTISEPTIC GYNECOLOGICAL SURGERY, AS PRACTISED AT THE ROOSEVELT HOSPITAL.

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Recognizing the fact that many of the profession have either not had the benefit of a hospital training, or else received this training previous to the advent of antiseptic and aseptic procedures, I have concluded that an account of the entire details of operations in some hospital, from the reception until the discharge of the patient, might be of interest to those who have been compelled to "work out their own salvation." In December, 1888, the Roosevelt Hospital established a separate operating-room and reception-ward for gynecological cases, Professor George M. Tuttle having been appointed Attending Gynecologist, and it is from the experience gained in this department that I note the following details.

It has been the endeavor to perfect some plan of operation which would not only meet the requirements of the recent advancements in antiseptic surgery, but would also be practical in its application. Every surgeon must have been confronted with the dilemma of being compelled to depend on those who did not realize the importance of absolute surgical cleanliness, and from this fact it is evident that he must reduce the technique of his operations to a condition of practical utility.

A new operating-room which has been in use for several weeks greatly facilitates the work, which had previously been done in a room twelve by eighteen feet.

To simplify matters, I speak first of major operations and afterward of minor cases.

When a patient has been received into the hospital she is given a thorough bath, including the head; she is supplied with freshly-laundried hospital garments, and a complete history of her previous condition and present illness is taken and preserved for record. A physical examination is made and a description of any abnormal condition ascertained is added to the previous notes. Her urine is examined every morning and the result recorded. The operator is given a card upon the day of operation, showing the existence or non-existence of any abnormal characteristics. The nurse is required to enter daily upon the bedside-notes the temperature, pulse, respiration, and the amount of urine passed. Unless the case is one demanding immediate operative procedure, four to five days are spent in preparing her for the operation. Her diet consists of those articles which will leave the least amount of solid residue in the

intestinal canal, such as soup, eggs, and a small amount of rare beef. Morning and evening she is given drachm-doses of compound licorice powder, until the evening previous to the operation, at which time all medication is discontinued. I specify the drug used since it has appeared to cause less flatus than others which have been tried.

In cases of doubt as regards the accuracy of the diagnosis the patient is examined while under the influence of an anæsthetic. The evening previous to the operation she has another thorough bath, the umbilicus receiving special attention. The pubes and the field of operation above are carefully shaved. A folded towel moistened with a solution of soft soap and water, equal parts, is placed over the abdomen, extending well down over the pubes, and is held in place by means of an abdominal binder. The next morning the patient is given an enema of soap-suds and a vaginal douche of 1 : 5000 bichloride solution. The towel is removed and the surface of the abdomen is washed with 95 per cent. alcohol and afterward with 1 : 1000 bichloride solution. A piece of damp bichloride gauze is now placed over the abdomen and is confined with a few turns of a roller bandage; this the patient wears to the operating-table. If the operation is to be performed in the afternoon, she is given a light breakfast and one hour before the operation one ounce of whiskey. Immediately before the etherization is begun she is catheterized, the urethral orifice having been previously sponged off with bichloride solution 1 : 5000.

The operating-table is an enamelled iron frame covered with two pieces of solid glass, which are inclined to its center, under which is a trough which empties into a basin below. The glass is covered with thick rubber pads.

Previous to the operation the nurses wash the operating-, instrument-, and dressing-tables with bichloride solution 1 : 1000. The instrument- and dressing-tables are covered with towels wet in the same solution. The instruments, with the exception of the knives, the needles, and all ligatures (except the cat-gut sutures) are wrapped in towels and boiled for one hour. The instruments and needles are transferred to glass trays containing a watery solution of hydronaphthol 1 : 1000. The ligatures, including the silver wire, are kept under 95 per cent. alcohol. The catgut used in the hospital is bought in the raw state. After all foreign matter has been wiped off, it is placed in strong ether for four hours. This removes any oily material which may be present. It is transferred from the ether to bichloride solution 1 : 1000, and is allowed to remain for eight hours. It is again wiped off with a bichloride towel and is placed in absolute alcohol. It is kept *under* the alcohol and small quantities are removed from time to time and are placed in the 95 per cent. alcohol, ready for operations. No gut larger than No. 4 is used.

The sponges are also prepared in the hospital. While dry they are

pounded lightly to remove the grit, after which they are placed in a solution of permanganate of potash, two ounces to the gallon, and are allowed to remain in this for two hours. They are next washed thoroughly in water and are transferred to a solution of hyposulphite of soda, three ounces to the gallon, to which has been added two ounces of hydrochloric acid, and are kneaded three or four times and at once washed in water until no odor remains. They are now stored in 3 per cent. carbolic solution.

The surgeon and his assistants, including the nurses, pay special attention to cleansing their hands and arms, using a stiff brush and soft-soap, being certain that the nails are thoroughly clean. After this the hands are washed in 95 per cent. alcohol and are then immersed in bichloride solution 1 : 1000. All then put on rubber aprons and cover these with linen gowns which reach to the feet. Great care is taken that the hands do not come in contact with anything which has not been rendered aseptic. Should it become necessary in arranging the patient on the table to touch parts which are not aseptic, the hands are at once washed in bichloride solution.

The patient being placed upon the table, with her feet on the foot-rest, rubber cloths covered with towels wet with bichloride solution 1 : 1000 are laid over her, above and below the field of operation. The bandage is then cut and the gauze is removed. The abdominal surface is sponged off with 95 per cent. alcohol, followed with bichloride solution 1 : 1000, no scrubbing-brush being used. Bichloride towels are fastened on either side of the field of operation, thus excluding all other portions of the patient's body. The operator and his assistants have near them two basins, the first containing bichloride solution 1 : 1000 and the other distilled water. From time to time during the operation the hands are dipped in the first and then in the second basin. The sponges are all counted previous to the operation and the number is noted on a blackboard, and before the wound is closed the nurse is required to account for all sponges used. A reserve set of sponges is always in readiness, so that if pus is encountered fresh sponges may be used after the irrigation.

Irrigation is resorted to under two conditions—if much oozing exists from the separation of adhesions, or if any septic (or possibly septic) matter has escaped into the peritoneal cavity. Distilled water only is used for this purpose, at a temperature of 112° F. A glass irrigator, holding three quarts, to which is attached by means of rubber tubing a glass nozzle fourteen inches long, with a smooth end, slightly curved, is the apparatus used. The tubing and the nozzle are always boiled with the instruments.

During the operation instruments not in use are kept under the hydronaphthol solution.

Heavy, softly twisted Chinese silk is used for ligating the pedicle. The stump is always seared with a Paquelin cautery and is dusted with iodoform before being dropped back.

Drainage is resorted to if irrigation has been performed. Straight glass tubes, fenestrated throughout the lower third, and long enough to reach the bottom of the cul-de-sac, are employed.

If adhesions have been numerous and oozing persists after the irrigation, iodoform gauze is packed over the raw surfaces and is allowed to protrude from the lower angle of the wound. The wound is closed with No. 24 or 26 silver wire, depending upon the thickness of the abdominal walls. The suture is passed through all the layers, the fascia having been previously drawn forward by the assistant. A provisional wire suture is inserted at the site of the tube if drainage is employed. Interrupted silkworm-gut sutures unite the edges of the skin. This is the constant method in closing the wound, the different layers of the abdominal walls never being united separately.

The wound having been closed is thickly powdered with iodoform and is covered with iodoform gauze. Damp bichloride gauze is placed over this and is in its turn covered with borated cotton. (This borated cotton is prepared in the hospital and is made by boiling absorbent cotton in a saturated solution of boric acid.) The dressings are held in place by three pieces of four-inch rubber plaster, which pass entirely around the body of the patient. A many-tailed abdominal binder, made of muslin, confines the dressings.

If pus has been encountered during an operation, the instruments are scrubbed with soap and water and are boiled for one hour, after which they are wiped dry. Otherwise, they are simply scrubbed in the usual manner.

The drainage-tube has been a source of annoyance and danger to many, and I give in full the method pursued in emptying it:

The tube is filled with strips of iodoform gauze when the operation is completed. Within two hours the tube is emptied. The patient being on her back, the bed-covering is turned down to the lower part of the binder and a light blanket is spread over her chest. These are covered with rubber sheets, over which have been placed damp bichloride towels. The surgeon removes his coat, puts on a clean apron, and disinfects his hands and arms as if he were entering the operating-room. The lower two or three tails of the binder are removed and the dressings are cut down to the tube, exposing the strip of iodoform gauze. Before the strip is removed a piece of bichloride gauze is placed around the opening of the tube. As the strip is removed the gauze is placed over the opening and is kept there until a fresh strip is ready to be introduced. Several strips are inserted and withdrawn until they cease to return from the bottom of the tube stained. A long probe, with a fork on one

end, is a simple and efficient means of carrying the strip to the bottom of the tube. The iodoform strips are kept in small glass jars, and no one is allowed to touch them whose hands are not perfectly clean.

These dressings are renewed, according to the amount of fluid present, at intervals of from two to four hours. As soon as a second or third strip used at any one dressing returns dry the tube is removed and the provisional wire is twisted. Should the gauze be used to pack any raw surfaces within the peritoneal cavity, it is removed as soon as the tube becomes dry, the latter being left for several hours after, in order that any fresh fluid which accumulates after the withdrawal of the gauze may be drained away.

Nothing is given the patient by mouth during the first twelve hours following the operation except small quantities of hot water to relieve the thirst. If she is suffering much pain, three or four minims of Magendie's solution of morphine are administered hypodermically. When the patient ceases to experience any nausea from the ether, small quantities of milk and lime-water are allowed, which amount is gradually increased according to circumstances. Nourishment is never given except at intervals of two hours.

An attempt is made to move the bowels as soon as any untoward symptoms, such as a rapid pulse, undue rise of temperature, vomiting or abdominal distention develop. Otherwise the bowels are moved on the third day. A one-grain calomel triturate, given every hour for three or four doses, is the medication usually resorted to, it having been found that the stomach shows a greater tolerance of this than other drugs that have been tried. In fact, it has appeared that the calomel in many instances has checked vomiting. An enema is administered eight or ten hours after the first grain of calomel has been given. Little or no medication is used after the operation, unless urgent symptoms arise which demand it. Nothing but fluid nourishment is given during the first week.

The sutures are removed on the eighth day, and the same antiseptic precautions are used as when the operation was performed. The patient is covered above and below the binder with damp bichloride towels spread over rubber sheets. The hands and arms of those who are to touch the wound or dressings are carefully disinfected and the instruments are boiled. The dressings are removed and the wound is sponged off with bichloride solution. After the sutures have been removed, the wound is again powdered with iodoform and a similar but lighter dressing than the primary one is adjusted. Great stress is laid upon the dressing being an occlusive one, and a mural or stitch-hole abscess is of rare occurrence in the ward. The second dressing is not removed for one week, after which all dressings are discarded and the patient is required to wear an abdominal binder.

In ordinary cases the patient sits up on the fourteenth day, and is allowed to leave the hospital on the twenty-first. But one patient during the past two years is known to have had a ventral hernia following laparotomy, and in this the fascia evidently was not carefully brought together at the upper angle of the wound. It is believed that this unusual freedom from herniæ is due to the care exercised in drawing the fascia well forward before the needle has penetrated the tissues.

A diagrammatic temperature and pulse chart is kept during the entire convalescence. A system of bedside notes indicating the exact condition of the patient, the number and character of the movements, and the amount of urine, is also kept. A specimen of the urine is tested, chemically and microscopically, every morning for one week following the operation, and longer should it contain any abnormal element.

The same care in regard to absolute cleanliness is carried out with minor operations. The preparation of the operating-room, the disinfection of the patient and arms and hands of the operators, is the same as in major cases In lacerations of the perineum through the sphincter the patient is subjected to treatment previous to the operation for at least five days. The bowels are freely opened and only fluid diet is allowed. The vagina is douched daily with 1 to 5000 bichloride solution. The perineum and adjacent parts are shaved and a damp bichloride pad is placed over the field of operation. After the operation the patient is catheterized every eight hours. The catheters used are made of glass, and are frequently boiled and kept in a bichloride solution. The nurse is required to carefully disinfect the urethral orifice before the catheter is introduced, and to place the tip of the finger over the end of the catheter before it is withdrawn, thus preventing any urine from escaping from the eye of the instrument. One or two small doses of opium are given after the operation to relieve the pain and to quiet any peristaltic action of the intestines. The wound is powdered frequently with iodoform, and a dry iodoform pad is kept over the parts by means of a T-bandage, and kept as dry as possible. The bowels are moved on the fourth day. On the evening of the third day one drachm of sulphate of magnesia is given at intervals of an hour until three doses have been administered. The next morning, if the bowels have not moved, one-half ounce each of castor oil and glycerin is given. The nurse is instructed to give the patient an oil enema as soon as any desire to have a movement is expressed. The enema is always given, both in these and other cases, through a soft rubber stomach tube, to which has been attached a funnel, by means of rubber tubing. The fluid to be administered is poured into the funnel and is allowed to appear at the eye before the tube is introduced. From this time forward the patient's bowels are kept open. The stitches are removed on the ninth or tenth day. During the past two years no failure of union of the sphincter has occurred.

Many cases of incomplete abortion are treated in this hospital and no labor is spared to render the patient and the operation as aseptic as possible. When such patients are received, if active hemorrhage is not taking place, they are given a thorough bath. The pubic and perineal regions are shaved. The condition of the heart is determined and a specimen of the urine is tested. Should these examinations justify it, the patient is anæsthetized. A thorough vaginal douche of 1 to 5000 bichloride solution is given. The surgeon, having rendered his hands and arms thoroughly aseptic, and wearing his operating-gown, proceeds to determine the condition of the os. Should he be unable to introduce his finger well into the cavity of the uterus, the os is forcibly dilated with a steel dilator.

When the product of conception is adherent, as much as possible is removed with the finger. A dull curette is used to free the cavity of any small fragments which may have escaped the finger, but the *finger* is always employed to determine the condition of the endometrium. The uterine cavity being empty, is irrigated through a double-current catheter with 1 to 10,000 bichloride solution at a temperature of 112° F. This usually causes firm contraction and a cessation of hemorrhage. In those cases in which the pregnancy is advanced beyond the fourth month and in which, by reason of lack of tone of the uterine tissue contraction fails to take place, strips of iodoform gauze are packed firmly into the cavity. It is the custom to operate upon all cases of incomplete abortion as soon as they enter the hospital.

No matter how slight the operation may be, the same scrupulous care is taken that everything coming in contact with the wound shall be absolutely clean. To secure this end, it will be seen that antiseptic and aseptic principles are combined—antisepsis previous to the operation, antisepsis in conjunction with asepsis during the operation, and asepsis after the operation.

REVIEWS.

A TREATISE ON THE DISEASES OF THE NERVOUS SYSTEM. By WILLIAM A. HAMMOND, M.D., Surgeon-General U. S. Army (Retired List), etc., with the Collaboration of GRAEME M. HAMMOND, M.D., Professor of Diseases of the Mind and Nervous System in the New York Post-Graduate Medical School and Hospital. Ninth Edition, with corrections and additions. New York, 1891.

DR. HAMMOND'S book holds a unique place in American medical literature. It was the first systematic treatise on diseases of the nervous system to appear on this side of the Atlantic. In fact, it was the first treatise of importance on its subject in the English language, for, if we except a few works which scarcely rose above the dignity of monographs, and the antiquated work of Abercrombie, the English themselves had produced no special treatise at the time (1871), when Dr. Hammond's first edition appeared. Certainly, if we except the somewhat fragmentary writings of Prichard and Marshall Hall, they had produced none to compare in value and completeness with the older work of Romberg, and the almost contemporary treatises of Rosenthal and Hammond. Their general medical text-books doubtless contained much excellent and some original writing on nervous diseases. The contributions to Reynold's *System* for instance were of enduring value, but they were the works of numerous hands, and were inaccessible to many in that encyclopædia. Long before this time Sir Charles Bell had stimulated to an unusual degree the study of nervous diseases, but his own writings were largely anatomical and physiological, with a decided surgical bias. He himself said: "I fear it will be a long time before combined efforts will enable a medical author to arrange and accurately describe the diseases of the nervous system." It is noteworthy that an American author was the first to fully realize in the English language this brilliant scheme.

Dr. Hammond's book has enjoyed an unprecedented popularity with the profession, not only because it was the first to take the field, but also because of the striking personality of the author and the force, not to say dogmatism, with which he expresses his opinions. This ninth edition is an evidence of this popularity. It is also an evidence of the confidence which a successful author comes to feel in the continued indulgence and applause of his readers; because the book in some of its parts is not presented in the thoroughly revised and amended shape which both its past record and the exigencies of the present time demand. This is the more to be remarked because the author has had the collaboration of his son, whose experience and ability amply fit him for, as his natural pride must incite him to, the congenial and profitable task of revision. Dr. Hammond's treatise no longer enjoys the field alone. It has many,

and some very formidable, rivals, and is bound to be measured by a standard which has changed much since 1871.

We have compared this with the fifth edition of 1881—the only one at hand—and find it practically almost the same. The former contains just two pages more than the latter, and most of these pages are identical, and printed apparently from the same stereotyped plates. It is thus seen that the book is rather a reprint than a new edition. How far haste of publication is responsible for this we do not know, but it is unjust to the merits, the reputation, and the claims of Dr. Hammond's treatise. Neurology is certainly a progressive science, and has made some notable advances during the last decade. The traumatic neuroses, we venture to say, are no longer in any other modern work treated of as anæmia of the posterior columns and of the antero-lateral columns of the spinal cord, according as they are respectively irritative and paralytic. This whole subject, which was elaborated by Dr. Hammond in his earlier editions with much plausibility and wealth of quotation from older writers, appears now in this edition rather antiquated. The author's position is certainly untenable. Again, cerebral localization, with its practical application in diagnosis and surgical treatment, has made great progress in ten years. The clinical work alone, done on this basis, has held the attention of the profession during that time as scarcely any other subject has done. It seems to us that the author has not done entire justice to this subject in his book. So, too, of multiple neuritis. Both the novelty and importance of the disease merit more than the cursory mention it receives in Dr. Hammond's book.

The relation of the infectious processes to various diseases of the nervous system is not ignored by Dr. Hammond. Tetanus is ascribed in this edition to the bacillus of Bonome. The researches of Pasteur in hydrophobia, however, are not credited with any definite results, and are dismissed with a very brief notice, while the description of the disease is long and diffuse, as in the former edition, and in itself presents nothing new. We have looked in vain for any adequate account of post-diphtheritic paralysis, and the various interesting nerve-lesions following other infectious diseases, as well as the acute delirious states occurring then, which could well be described in such a comprehensive treatise. These paralyses are briefly referred to, and classified under the head of anæmia of the antero-lateral columns of the cord—a pathology which is unreasonable, and, as the author himself says, has never been proved.

The chapter on syringomyelia has been added to this edition. The author inclines to the opinion that the majority of cases develop in subjects whose spinal cords were previously normal. Bruhl, however, has shown in his recent monograph that the congenital origin of these cases is most probable, and suggests the name *gliomatosis* for the proliferation of gliomatous tissue about the central canal in badly developed cords, to which class of cases he would confine the term. We have searched carefully but have found no description of Friedreich's disease of porencephalus or of the cerebral palsies of children.

Dr. Hammond's treatise will continue to meet with favor in the profession—to which its author therefore, owes the tribute of a careful revision of its successive editions. We believe that some of its pathology could have been profitably rewritten in this ninth edition, and that the many long quotations and detailed descriptions of the author's own

cases, together with the merely theoretical and dogmatic statements in the book, could have been much curtailed, or even entirely replaced, by more careful descriptions of the morbid anatomy, symptoms, and natural history of some of the more recently studied diseases. Some space also could have been gained thus for detailed anatomical studies of the central nervous system, in which the book is rather lacking.

We have indicated what appear to us to be a few lingering defects in a book whose reputation is already thoroughly established. Its merits have long spoken for themselves. In succeeding editions, which we hope to see, the younger Hammond will no doubt see to it that the work is kept well abreast of the times, and that it continues to sustain the reputation of its author. J. H. L.

SURGERY: A PRACTICAL TREATISE, WITH SPECIAL REFERENCE TO TREATMENT. By C. W. MANSELL MOULLIN, M.A., M.D. Oxon.; Fellow of the Royal College of Surgeons; Surgeon and Lecturer on Physiology to the London Hospital; formerly Radcliffe Travelling Fellow and Fellow of Pembroke College, Oxford, England: assisted by various writers on special subjects. Five hundred illustrations. Pp. 1180. Philadelphia: P. Blakiston, Son & Co., 1891.

THE aim to make this valuable treatise practical by giving special attention to questions of treatment has been admirably carried out. Many a reader will consult the work with a feeling of satisfaction that his wants have been understood, and that they have been intelligently met. He will not look in vain for details, without proper attention to which he well knows that the highest success is impossible. As is quite proper at the present day, in a treatise on general surgery, little space is given to such departments as diseases of the eye, ear, larynx, skin, etc., and these subjects are treated by those specially fitted to do so.

The germ theory, in its application to surgery, receives the fullest acceptance. Septic fever and sapræmia (from absorption of ptomaines) are described as due to non-infective organisms, while true septicæmia is due to an infective germ. It is practically impossible to separate them clinically. Ulcers are classed with abscesses, as due to infective organisms. A burn, for instance, does not leave an ulcer, provided no other irritant is allowed to appear. Traumatic fevers should be clearly separated from those which are due to septic decomposition. Two forms are described: one, neurotic, as from emotion or peripheral nerve irritation; the other, caused by absorption from the wound of products probably related to the coagulation process.

Rabies is a specific disease for which "the only treatment of any service at all is the inoculation plan, discovered and perfected by Pasteur, and by which he has succeeded in reducing the mortality to 1.47 per cent. on the whole number (2164); and to a very much lower figure still, if only the later cases and those which applied for treatment soon after the injury are reckoned."

The use of antiseptic solutions is discussed in a very sensible way from the standpoint of practice, rather than of theory.

In the controlling of hemorrhage from deep-seated wounds, as those of the vertebral artery, packing from the bottom with iodoform gauze is advised, instead of attempting ligation. Punctured wounds of the deep plantar and palmar arches are to be treated by pressure. In the treatment of spina bifida, the author thinks that excision of the sac should very rarely be undertaken, and says that the only treatment which has met with any success is that of injection.

The work is especially rich in material which concerns the injuries and the diseases of bones and joints, to which is devoted one of the most admirably prepared and valuable portions of the book. An excellent chapter is that devoted to the treatment of fractures. The details of manipulation are so described, and such attention is paid to minor points, that anyone can follow out intelligently the advice given. The skilful use of a splint may be much more important than the shape or variety used. The writer is very fond of the plaster-of-Paris dressing; sometimes used from the first, with proper selection of cases, and immediate cutting, or in almost all cases after the first few days. Details given as to proper application are most practical. In the treatment of compound fractures the general attitude is toward a wise conservatism, determined by the light of modern methods. Compound fractures entering the knee-joint, as well as those of the thigh, still usually call for amputation, in spite of antisepsis, when they are due to direct violence. The limb can usually be saved, however, when the injury has been indirect.

After fracture of the spine, operation is opposed when indirect violence has caused the injury. The argument for this is hardly proven—that "the injury to the nerve structures is either so slight that an operation of such a nature is not justifiable, or so severe that it could do no good." In fracture by direct violence, on the other hand, "the operation should certainly be performed at once," if compression is suspected, without destruction of the cord. Especially is this advised in injuries of the cauda. He quotes the statistics of Thorburn—sixty-one trephinings for injury, only one a complete success; in seven only a *bona fide* improvement, and in six of these the improvement was in the cauda.

The operation for radical cure of hernia after herniotomy is looked upon with favor, Macewen's method being especially approved.

In acute intussusception, if enemata fail, laparotomy is advised within the first twenty-four hours, just as herniotomy is done if taxis fails.

In acute obstruction of the bowels laparotomy is to be done as soon as the diagnosis is definite, other treatment being worse than useless. As an important feature of the operation the author refers to the strong advice of Greig Smith to empty the overdistended bowel of gas by an incision or the use of a large trocar. This enormous distention will alone continue the obstruction by causing acute flexures.

No fewer than 200 of the 500 illustrations have been prepared expressly for this book. They are for the most part excellent in that they show clearly what is intended to be shown, which is of greater importance than size or display of workmanship.

The author's name is spelled with one "l" on the cover and with two on the title-page. G. E. S.

ELEMENTS OF PRACTICAL MEDICINE. By ALFRED H. CARTER, M.D. Lond.; Member of the Royal College of Physicians, London; Physician to the Queen's Hospital, Birmingham; Emeritus Professor of Physiology, Queen's College, Birmingham, etc. Sixth edition, 8vo, pp. xvi., 496. London: H. K. Lewis, 1891.

BY brevity and condensation Dr. Carter has skilfully gotten a vast deal of material into a relatively small compass, and this, too, without more than the inevitable sacrifice of accuracy or completeness. The present edition contains, in addition to the sections on general diseases, diseases of the respiratory, circulatory, alimentary, urinary and nervous systems, chapters on general pathology and diseases of the skin. At the conclusion of the work is a therapeutic index.

A number of minor defects and omissions do not materially impair the value of the book. The organisms of Laveran receive no recognition in the discussion of malarial fevers; nor is reference made to the pernicious types of malarial infection, hemorrhagic malarial fever, the cerebral, pulmonary and gastric forms. The great value of morphine and pilocarpine, given subcutaneously, in aborting the paroxysms of these grave malarial fevers is also not mentioned. The subcutaneous injection of pilocarpine also acts with almost specific certainty in erysipelas. It is rather doubtful if so-called gonorrhœal rheumatism will yield to treatment useful in acute articular rheumatism. In the treatment of syphilis, mercury may be applied not only by inunction, fumigation, and internal administration, but also by subcutaneous injection.

That a section should be devoted to the general subject of carcinoma finds warrant in the statement that "it yet remains to be settled whether, on the one hand, the newgrowth is but the local expression of a constitutional taint; or, on the other, whether it is primarily a local disorder, and only affects the general system secondarily." In the symptomatology of diseases of the stomach a description is given of "pain," which the probable omission of a word makes the text say "is altogether absent." The smooth, white kidney and the granular, contracted kidney are given as the representatives of chronic Bright's disease, and a common treatment is prescribed for both. We are accustomed to believe that while iron is useful in the one case, it is hurtful in the other. The lardaceous kidney is recognized as a distinct form, but nothing is said of the occurrence of waxy casts in the urine. It is true that we have no medicinal treatment for chyluria, but the disease can be cured by removal to a climate in which the filaria cannot live. The subject of dengue may have been omitted because the disease occurs only in tropical countries, but the same limitation does not apply to tetanus, which is as much deserving of a place in a work on practical medicine as is hydrophobia. Notwithstanding the foregoing criticisms, the book bears the stamp of a careful observer, an accurate recorder and a versatile writer, and can be confidently commended to the student as an "introduction to the study of systematic medicine."

A. A. E.

A GUIDE TO THE CLINICAL EXAMINATION OF THE URINE. By FARRINGTON H. WHIPPLE, A.B. Harv. 8vo, pp. x., 206. Boston: Damrell & Upham, 1891.

THE "aim in writing this little book" is stated as having been "to condense the essential features of larger and more diffuse books, and to present the subject in a more readily accessible and practical form," and in this aim the author has creditably succeeded.

At a time in the past not beyond the range of memory, examination of the urine was made only in obscure cases, and when the symptoms suggested the existence of derangement in the genito-urinary tract, and especially of the kidney. Now, however, such examination is almost universal in hospital practice, and quite general in private practice; so that the investigation of a given case is not considered complete without a knowledge of the condition of the urinary secretion; while the obstetrician who neglects to repeatedly examine the urine of a pregnant woman is held guilty of culpable neglect. With this advance in clinical study, manuals on the subject have multiplied, and thorough works on the practice of medicine devote considerable space to its discussion.

It should be borne in mind that the presence or absence of albumin in the urine is not always conclusive as to the existence or non-existence of disease of the kidney. Casts may be found when it had not been possible to detect the presence of albumin; and examination of urine from an unequivocal case of nephritis will, from time to time, fail to detect the presence of either albumin or casts.

We do not believe that a clinical distinction between hyperæmia and inflammation of the kidney can be maintained. The presence of albumin and casts in the urine must be accepted as evidences of inflammation, from which, of course, recovery may take place, without leaving clinical traces of previous disease.

The subject of acetone is not at all referred to. A. A. E.

'CYCLING AND HEALTH—LA SANTÉ PAR LE TRICYCLE. By OSCAR JENNINGS, M.D. Paris, M.R.C.S. Eng. Translated from the French, third edition, Paris, 1889. By J. CROSSE JOHNSTON. Pp. 244. London: Iliffe & Son.

MADEIRA AND THE CANARY ISLANDS. A PRACTICAL AND COMPLETE GUIDE, FOR THE USE OF INVALIDS AND TOURISTS. With nine maps. By A. SAMLER BROWN. Second edition. Pp. 130. London: Sampson Low, Marston, Searle & Rivington, Limited, 1890.

STRATHPEFFER SPA: ITS CLIMATE AND WATERS. WITH OBSERVATIONS HISTORICAL, MEDICAL, AND GENERAL, DESCRIPTIVE OF THE VICINITY. By FORTESCUE FOX M.D. Lond., Fellow of the Medical Society of London. Pp. 165. London: H. K. Lewis, 1889.

'Cycling and Health contains, in epitome, the opinions concerning the 'cycle, "both of those invalids who have recovered their health by its

use, and of those medical men who have turned their attention to the subject." The latter include such eminent Englishmen as Drs. B. W. Richardson and Lionel Beale. The author is evidently an enthusiastic 'cycler, who regards 'cycling as a first-rate remedy for a large number of ailments, some of which are varix, rheumatism, gout, obesity, constipation, diabetes mellitus, and various functional nervous disorders. The subject is presented so attractively that one can scarcely resist the desire to become a 'cycler, and thus enjoy some of the many benefits accruing from such invigorating exercise. The healthfulness of 'cycling and its superiority over indoor gymnastics is due to the open-air life the 'cycler leads, with sufficient exercise to properly employ the body and mind. It is superior to walking, since it is less monotonous and fatiguing, and is generally to be preferred to horseback exercise, because of its being far less expensive and troublesome. The book is well worth a perusal by those who have patients with rebellious ailments arising from too sedentary living.

The appearance of a second edition of *Madeira and the Canary Islands* in a surprisingly short time after the issue of the first may be accepted as a sufficient guarantee of its excellence, and that it fills the niche justifying its publication. It is intended, not alone as a *vade mecum* for travellers, but as a guide-book to physicians and laymen who desire complete condensed information concerning these islands as a health resort.

Strathpeffer Spa: Its Climate and Waters, its author informs us, is prepared for medical men and laymen interested in Strathpeffer and the Spa. It is, we should judge, an important contribution to the better knowledge of this health resort, and as such we commend it those who have in mind a visit to Strathpeffer. D. D. S.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

FRANCIS H. WILLIAMS, M.D.,

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Arsenic as a Drug.

In a lecture on this subject Dr. Jonathan Hutchinson points out some of the conditions under which this remedy is of especial service. It appears to possess specific power in persisting pemphigus. As a rule, no fresh bullæ are produced after the administration of the arsenic has been commenced, and the patient quickly regains health, with perfect soundness of skin.

In the treatment of common psoriasis, although the effect of arsenic is quite as definite and certain as in pemphigus, it is not nearly so immediately curative. Sometimes its effects are first manifested by the patches taking on a congested condition, and becoming very irritable. In a large majority of cases it will in the end, if well pushed, cause the eruption almost wholly to disappear. It seldom or never brings about a complete cure, and of late years we have been so much accustomed to reinforce it by efficient local measures that it is not always easy to estimate the proportion of our indebtedness to it.

As a tonic arsenic should be used only in small doses. In elderly persons, unless the disease imperatively demands it, it should not be prescribed. With the young, arsenic appears usually to agree well, and even very young children, although they but seldom need it, will bear full doses without ill effects. Amongst the facts which have been thoroughly established as regards the possible effects of arsenic it may be claimed that it is an undoubted cause of peripheral neuritis. Its influence in inducing herpes zoster, when given for the cure of other skin diseases, affords the most common example of this. It has been observed by those studying cases of poisoning by arsenic, and is especially noted by Christison, that local and unsymmetrical forms of paralysis not very infrequently result. During its medicinal use patients not in-

frequently complain of local numbness, more especially of portions of the skin of the lower extremities. Numbness and tingling of the soles of the feet are by no means infrequent symptoms.

It is a very important question, especially in reference to chronic skin diseases requiring its use during long periods, whether arsenic is prejudicial or otherwise to the general health. If given in small doses, with the exception of the risk that it may cause shingles, its effects are usually inappreciable, and there is no danger of its cumulative influence. If arsenic be given in full doses for long periods, although it may be doubted whether there is any reason for styling it a cumulative drug, its employment is not without danger. There are certain symptoms which ought to lead us to take alarm. If the patient has numbness of any particular part of the skin, or if there be decided loss of flesh, then it ought to be suspended. Irritation of the conjunctiva is, of course, a well-known symptom of disagreement, but it may not be observed as frequently as some of the others just mentioned, and to them may be added a liability to diarrhœa, and, in a certain number of cases, extreme irritability of the bladder.

Under regular medical supervision a patient cannot well receive injury to his general health from arsenic. If, however, a patient who has received great relief from his skin affection has obtained a prescription which he uses on his own responsibility, and with perhaps considerable increase in the dose ordered, it is then possible that serious or even fatal results may ensue.

As regards the influence of arsenic on the skin in persons previously healthy: Now and then we have opportunities to observe its action upon the skin when it is prescribed for maladies quite apart from the skin itself. Its effects upon the nutrition of the skin, if the doses are large, is to make it brown and muddy-looking; it is also dry and harsh on the trunk and limbs generally, although there may be perspiration on the palms and soles. The discoloration may be attended with actual pigmentation, and may increase until it almost resembles the tint of Addison's disease.

In extreme cases not only is there dryness and discoloration, but scaly patches may form on the knuckles, elbows and knees, much resembling common psoriasis, but less well circumscribed. A much commoner result than this is, however, disturbance of the nutrition of the skin, not over the body generally, but over the palms and soles only. On these parts, in addition to dryness, corns may form, and in certain very rare cases these corns pass on into epithelial cancer. A peculiarly dry condition of the palms and soles, with tendency to the formation of corns, is by no means an infrequent result of long-continued courses of arsenic, and should lead to its discontinuance.—*British Medical Journal*, No. 1588, 1891.

Opiates in Acute Peritonitis.

Dr. Stephen Smith directs attention again to the importance of large doses of opium in treating acute peritonitis.

Under Professor Alonzo Clark's direction he treated six cases in 1840. The patients were seen every hour, the pulse and respiration closely watched. The quantity of opium was to be determined by the effects produced, not at all by the amount administered. The condition of the patient to be secured

was that of semi-narcotism; this was to be determined by the degree of stupor and the respiration; the patient must require to be shaken to be aroused to consciousness; and the respiration might fall to twelve per minute, but not below that figure.

At the outset each patient received one grain of opium every hour for three doses. No effect being perceptible, the dose was increased to two grains every hour, and continued for three doses. Failing with this dosage, the opium was increased to three grains every hour. In four cases this amount of opium had the desired effect, and it was continued in that amount. In the remaining cases it had to be increased to four grains every hour. One of these remaining cases yielded to this amount, and the opiate was continued at that rate. The sixth case was much more obstinate, and the opium was steadily increased until the dose reached was twelve grains every hour. This amount simply secured a light but continuous sleep, from which she readily awoke on placing the hand upon her wrist to examine her pulse.

The first four cases continued to receive three grains of opium every hour for three or four days, when the pulse fell to its normal standard, the tympanites subsided, the tenderness of the abdomen disappeared, and the patients were evidently convalescent. The opium was discontinued. They rapidly recovered and remained well.

In the fifth case, on the fourth night the patient was given so much opium, four-grain doses, that she was too deeply narcotized; she was without pulse, pale, and with only four respirations per minute. Active measures were taken to recover the patient from her profound narcotism. After several hours of continuous effort she was regarded as securely restored. All symptoms of peritonitis now rapidly subsided; the pulse had fallen from 112 to 92 per minute, the tympanites and tenderness had disappeared, and she expressed herself as feeling well. Within twenty-four hours all evidences of peritonitis recurred, and the treatment was renewed, three grains of opium being given instead of four. Semi-narcotism was readily produced, and after a brief period the symptoms again subsided; the treatment was suspended, and she was perfectly cured.

The sixth case proved an anomaly in tolerance of opiates. During twelve days the treatment was persevered in, the pulse remaining at about 120, the respirations 34 to 36, the abdomen greatly distended and tender to the touch, lancinating pains, the features pinched, perspiration at intervals, etc. During these twelve days the patient took the equivalent of 1950 grains of opium, and she neither vomited during that time nor had an evacuation from her bowels. At no time was she so narcotized that she would not awaken when a hand was placed upon her wrist. She remained in the hospital as an assistant in the laundry for six months after her recovery, and during that time she was in excellent health.

Professor Clark thus describes the method of medication: The plan is to begin with a dose that is safe, say two or three grains of opium, or its equivalent of sulphate of morphine, and in two hours notice its effect. If any of the opium symptoms have appeared, repeat the dose, if not, increase by one grain, and so on at intervals of two hours till the degree of tolerance in the patient is ascertained. After that the case can be treated by a diminished occupation of the physician's time—two or three visits a day. The dose is to

be increased if the opium symptoms diminish, or discontinued if narcotism is approaching. The duration of the treatment will be sometimes no more than two or three days; it may be a week, or even a fortnight; and in one case the symptoms persisted mildly for forty days and then yielded. In this case the medicine used was sulphate of morphine, and the enormous dose reached, by steady and gradual increase, was one grain and a quarter every forty minutes, in a boy ten years old.

Of the several signs of opiumism there is none more valuable than the frequency of the respiration; and while the physician aims to reduce it to twelve in a minute, there are chances that he will see it fall to something below that.

Professor Clark does not explain the curative action of opium in peritonitis, but Professor Fordyce Barker, who had a large and varied experience in puerperal peritonitis in Bellevue, considered opium the most important of all agents in arresting and controlling this disease. By it the peristaltic movements are retarded or arrested, and thus the inflamed tissues have absolute rest, pain is annulled, emotional excitement is allayed, the nervous system is tranquillized, sleep is secured, and thus the depression of the vital forces resulting from the shock of the attack is lessened.—*Medical Record*, vol. xxxix., No. 22, 1891.

Cactina.

Cactina is the proximate principle of the plant Cereus grandiflora, which is indigenous in tropical America. It is unirritating, a 10 per cent. solution applied to the conjunctiva produces no noticeable effect.

It is thought to increase the heart's energy and increase the blood-pressure in this way and also through stimulation of the vasomotor centre. It is said to resemble strychnine in its action upon the motor centres of the cord.

Clinical observation suggests that its greatest value is manifest in functional disturbances of the heart, as simple dilatation and cardio-muscular atony, without organic lesions. A special indication for its use is during the critical periods of adynamic fevers, as it combines the elements of a heart and spinal motor stimulant.

Unlike digitalis, cactina may be administered continuously without fear of exciting gastric disturbance, and the objectionable cumulative action of the former drug is entirely absent. It may be employed in all varieties of functional cardiac disease and circulatory disturbances, and in organic heart disease, except in cases of mitral stenosis, where digitalis is to be preferred on account of its power of prolonging the diastolic period. In aortic insufficiency the short diastole produced by cactina allows no time for regurgitation of blood into the ventricle, whereas digitalis, by prolonging the diastolic period, favors just what we should seek to prevent.—*New York Medical Journal*, vol. liii., No. 24.

Hæmorrhoids.

Iodide of potassium	℥ss.
Iodine	grs. viij.
Glycerin	℥j.

Small plugs of cotton steeped in this solution are applied every three or four hours to the piles.

By this treatment the inflammation subsides, and the hæmorrhoids diminish rapidly in volume, and finally disappear.—*Medical Press*, June, 1891.

MEDICINE.

UNDER THE CHARGE OF

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Sudden Death from Spontaneous Rupture of the Aorta.

Martin-Dürr (*Archives Générales de Médecine*, 1891) reports the case of a woman of eighty-seven, who, two hours after dinner, was suddenly seized with pain in the back, on the left, which apparently subsided under treatment, though a sense of oppression of the chest and slight dyspnœa continued without disturbance of the respiratory rhythm. The intelligence was preserved throughout. Suddenly, two and a half hours later, the pain returned, and death took place immediately by syncope. At the autopsy, between the cæcum and the right kidney was found a cyst as large as an orange, with delicate, translucent walls, containing clear, limpid fluid of lemon-yellow color and highly albuminous. The splenic artery was as large as a little finger, extremely tortuous, nodulated and atheromatous; the liver was small and fatty; the gall-bladder contained a small cubical calculus. On removing the liver no blood flowed from the inferior vena cava. The internal and external iliac arteries and the abdominal aorta were in a high degree atheromatous. The right lung was emphysematous, adherent at the apex, and completely filled the pleural cavity. The pericardium was displaced toward the median line, and the lung pushed forward and upward. The left pleural cavity was filled with an enormous quantity of sanguinolent fluid and considerable clotted blood. The left lung was free, compressed, but crepitant. The pericardium and its cavity were normal. The heart was not hypertrophied, but laden with fat. The walls of the left ventricle were pale and of moderate thickness. The cavity of the heart contained neither fluid blood nor clot. The mitral orifice was normal; on the aortic valves were some calcareous nodules. The aorta was enormously dilated and contained numerous atheromatous patches. At the junction of the horizontal and descending portions, a little beyond the origin of the left subclavian artery, was an extensive opening almost four inches long, transverse to the axis of the vessel,

in a spiral course involving its entire circumference and occupying the interval between two large calcareous plates. The margins of the torn surface were scarcely separated, and the peri-aortic connective tissue was infiltrated with blood, but at no point was the tear incomplete. The hemorrhagic infiltration extensively involved also the mediastinal connective tissue. It formed an ecchymotic area at the level of the third, fourth, fifth, and sixth dorsal vertebræ, to the left of the spinal column. The orifice of communication between the aorta and the pleural cavity could not be found.

Dürr has succeeded in collecting from the literature twenty-eight other cases of rupture of the aorta, in addition to the twenty-eight reported by Broca, the eighty reported by Peacock, and the fourteen reported by Pilliet. An analysis of these cases leads him to arrange them in three groups: 1, those without the production of dissecting aneurisms, which are rare; 2, those with the production of dissecting aneurisms, which are relatively common; and, 3, those with the production of true aneurismal sacs, which are exceedingly rare. Spontaneous ruptures of the aorta are more common in men than in women, and especially common at advanced age. In many cases no exciting cause has been apparent; in some it was slight, and in others, violent effort, anger, emotion, or a large meal acted as a cause of rupture. Death may occur suddenly; or slowly, at once; or slowly in two periods, separated by an interval. The first is uncommon; the second, the least common; the third, the most common. The most usual seats of rupture, in the order of frequency of occurrence, are the origin of the aorta, its ascending portion, the beginning of the arch or the origin of the innominate, the horizontal portion, the termination of the arch and the beginning of the descending portion of the thoracic aorta, and, finally, the abdominal aorta. The rupture is generally transverse. The blood is usually discharged into an adjacent cavity—most commonly into that of the pericardium; much more rarely, into the left pleural cavity; occasionally, into the trachea or into the œsophagus. Sometimes the blood finds its way only into the peri-aortic and mediastinal connective tissue or beneath the left pleura, forming a tumor in the thoracic wall between the left lung and the pericardium. The most common anatomical cause of rupture is atheroma of the aorta, often associated with dilatation. In the majority of cases the left ventricle is hypertrophied. Valvular lesions may or may not coexist. The diagnosis is scarcely possible. There may be severe pain in the pre-sternal region and between the shoulders, with intense anxiety and distress, while respiration remains normal and percussion and auscultation disclose no abnormality in the pulmonary functions.

Sudden Death from Rupture of Varices of the Heart.

Journiac (*La Médecine Moderne*, 1891) reports the case of a man of fifty-five, coming under his observation with delusions of persecution associated with hallucinations, probably of alcoholic origin. These manifestations speedily disappeared, a condition of dementia remaining. Nothing of note transpired during a period of more than five years. At the end of this time the patient was suddenly seized with loss of consciousness of brief duration, three or four seizures occurring rapidly in succession. A number of months

later another attack occurred, which soon terminated fatally. Upon post-mortem examination nothing abnormal was found in the brain. The cavity of the pericardium was distended by an immense clot. At the left border of the left ventricle, a little below the auriculo-ventricular septum, was an ovoid tumor of the size of a small nut, dark in color, with a small opening at its summit, containing a loose clot; but between the cavity of which and the ventricle or a vessel no opening could be found. Above and below were a number of tortuous varicose swellings, none of which communicated with the ventricle. The branch of the coronary artery behind the tumor was normal. The heart itself was in other respects in good condition.

Obstruction and Insufficiency at the Tricuspid, Mitral, and Aortic Orifices.

Before the Boston Society for Medical Observation, Shattuck (*Boston Med. and Surg. Journal*, 1891) reported the case of a domestic of forty-three, with a history of scarlatina at eleven, of muscular rheumatism at twenty-eight, and of alcoholism. Following the attack of rheumatism there were asthmatoid seizures. Later on there were bronchitis, dyspnœa, œdema and ascites, derangement of menstruation, icterus, and diarrhœa. The area of cardiac dulness was increased, especially to the right. Over the aortic, mitral, and tricuspid orifices double murmurs were heard. The aortic-systolic was transmitted in the course of the great vessels; the diastolic, downward, along the sternum. The presystolic murmurs heard over the mitral and tricuspid orifices differed in quality. The jugular veins were distended and pulsated. Subsequently the tricuspid-presystolic murmur could not be detected. The area of hepatic dulness, at first increased, became diminished. Systolic retraction became apparent in the region of the apex of the heart. At the autopsy the pericardial cavity was found obliterated by old adhesions. The heart was enlarged; the aortic valve was incompetent; the pulmonary held water. The aortic crescents and the mitral leaflets were thickened, shortened and adherent, and the respective orifices narrowed. The tricuspid leaflets were thickened and shortened, with delicate vegetations at their margins; the orifice was narrowed. Delicate translucent vegetations occupied the pulmonary crescents along the lines of apposition. Two of the segments were adherent. The left ventricle was neither hypertrophied nor dilated; the left auricle was dilated. The right ventricle was hypertrophied; the right auricle dilated. The aorta and pulmonary artery were atheromatous and dilated.

Malformation of the Heart and Great Vessels.

Macaigne (*Bulletins de la Soc. Anat. de Paris*, No. 1, 1891) reports the case of a girl of eighteen, in whom, when eighteen months old, a cardiac affection was recognized. She could not participate in the games of children of her age. On the slightest exertion or emotion she became oppressed and cyanotic. For several years there had been cough and occasional hæmoptysis. The face was pallid, livid, puffy; the lips, nostrils, and fingers were cyanotic; the skin was pallid, but not cold; the cellular tissue was relaxed; the ex-

tremities of the fingers were clubbed. Dyspnœa was marked; the pulse accelerated. The cardiac action was regular and energetic; the impulse below the nipple. On auscultation a coarse, low-pitched, rasping systolic murmur was heard, with greatest intensity at the left third chondro-sternal articulation and at the inner part of the left second intercostal space, in the latter situation seeming more superficial; the murmur was propagated toward the middle of the left clavicle; the second sound of the heart was normal. On palpation a purring tremor could be felt over the area in which the murmur was heard with greatest intensity, particularly at the inner part of the second left interspace. The pulmonary percussion resonance was impaired on the left, below the clavicle, and in the supra-spinous fossa. Subcrepitant and sibilant râles were heard at both apices. There was cough, without expectoration. Several hæmoptyses occurred, following one of which the patient died asphyxiated. At the autopsy the apices of the lungs were found stuffed with tubercles, some of which were caseous; in the left apex were a number of small cavities. The leaflets of the pulmonary valve, which was competent, were replaced by a membrane projecting into the artery like a cone, of which the length was about a third of an inch and the diameter of the free orifice about one-sixth of an inch. The trunk of the vessel, at its middle, was an inch and a half in circumference; its walls thin and soft. The pulmonary artery divided regularly, but there was no trace of a ductus arteriosus. The thickness of the wall of the left ventricle was normal; of the right ventricle and between the ventricles, greatly increased. The tricuspid valve was well developed. The chordæ tendineæ were thickened, the papillary muscles and columnæ carneæ hypertrophied. The right ventricle communicated directly with the aorta, the conus being narrowed and limited in front and behind by two large muscular fasciculi. The interventricular septum was defective at its upper part; the free border was concave. The aorta was situated *à cheval* above the septum. The aortic valve was competent. The aorta was dilated. The right auricle appeared to be thrice as large as the left. The interauricular septum was defective. The duct of Botal was represented by three minute openings. On the septum were numerous bands, giving rise to an areolar appearance. The ductus arteriosus was wanting, but by the side of the aorta was a small cul-de-sac. No other arterial anomaly was discovered.

Changes in the Sputum of Patients Treated by Tuberculin.

Amann (*Centralblatt für Bakteriologie und Parasitenk.*, 1891), of Davos, describes the changes which he has observed in the sputum and in the contained tubercle bacilli of patients with diseases of the lungs treated by injections of the Koch fluid. His statements are based upon examinations of the sputa of 288 patients, 198 of whom received injections. It was found that the quantity of the expectoration and the number of bacilli were, as a rule, increased after reaction had occurred. The appearance of the bacilli was changed. The rods appeared broken up into numerous small fragments. The bacilli stained poorly, apparently from a diminution of their specific resistance to decolorizing agents. In 40 per cent. of the cases injected, reac-

tion was followed by a diminution in the quantity of elastic fibres in the sputum.

Alterations in the Bacilli Expectorated by Patients.

Vierling (*Wiener klin. Wochenschrift*, 1891) admits that the bacilli in the sputum exhibit certain changes in form and in behavior toward the aniline stains after injections of the Koch fluid, but denies that these changes are evidences of an alteration in the chemical constitution of the body in general and of the medium in which the bacilli live in particular, and concludes that the changes must be due to purely local causes. He reports a case in a girl, thirteen years of age, which terminated fatally, and in which, during life, alterations in the shape of the bacilli in the sputum were found, while the bacilli in the diarrhœic stools remained unchanged. It would be important to know whether the changes observed were the results of degeneration or of growth.

Angina Pectoris.

R. Douglas Powell (*Practitioner*, April, 1891, No. 274) argues that angina pectoris is a disturbed innervation of the heart or vessels, associated with more or less intense cardiac distress and pain, and a general prostration of the forces, always producing anxiety and often amounting to a sense of impending death. Considerable stress is laid on habitual high arterial tension as a factor in causation. Angina is not necessarily associated with coronary or other disease of the heart or vessels, although it is true that in fatal cases disease or obstruction of the coronary arteries is the most frequent lesion found, after which in order of frequency come fatty degeneration, aortic dilatation, aortic regurgitation, and aneurism. The author classifies the varieties of the affection as follows:

1. In its purer forms we observe disturbed innervation of the systemic or pulmonary vessels, causing their spasmodic contraction and consequently a sudden extra demand on the propelling power of the heart, violent palpitations, or more or less cramp or paralysis ensuing according to the reserve power and integrity of that organ—angina pectoris vasomotoria.

2. In other cases we have essentially the same mechanism, but with extra demand made upon a *diseased* heart—angina pectoris gravior.

3. The trouble may commence at the heart through irritation or excitation of the cardiac nerves, or from sudden accession of anæmia of cardiac muscle from coronary disease—primary cardiac angina.

4. In certain conditions of blood (often gout), or under certain reflex excitations of the inhibitory nerves, always, however, with a degenerate feeble heart in the background. We may observe intermittence in its action prolonged to syncope—syncopal angina.

Treatment.—In group 1, nitrite of amyl, and still more nitro-glycerin, are of great value, and may require to be combined with nervine tonics or sedatives, iron, zinc, valerian, bromides, etc. In groups 2 and 3, carminative stimulants, or digitalis with nitro-glycerin, are recommended; and of all tonics arsenic, as a rule, is the best.

Bacterium Coli Commune in the Pus from a Dysenteric Abscess of the Liver.

Veillon and Jayle (*Compt. rend. hebdom. des Séances de la Soc. Biol.*, 1891) report the case of a patient admitted June 11, 1890, to the Hôpital Lariboisière, with the symptoms of abscess of the liver, having had dysentery in 1881 at Tonkin. From the pus removed by aspiration no cultivable organism could be obtained. Microscopic examination, culture in agar and gelatin of the pus obtained a month later by incision, however, revealed the exclusive presence of the bacterium coli commune. The patient recovered. This observation seems to demonstrate that the bacterium coli commune may invade organs adjacent to the intestine, when these are the seat of disease, without possessing special pathogenetic properties, though perhaps tending to retard recovery.

A New Test for Albumin and other Proteids.

John A. MacWilliam (*Brit. Med. Journ.*, No. 1581) states that the reagent is a saturated watery solution of salicyl-sulphonic acid, a white crystalline substance readily soluble in water and alcohol. It precipitates all classes of proteids: 1, native albumins (egg-albumin and serum-albumin); 2, derived albumins (acid-albumin and alkali-albumin); 3, globulins (*e. g.*, serum globulin and myosin); 4, fibrin (whether held in solution by dilute alkalies or by neutral salts); 5, proteoses (albumoses, etc.); 6, peptones.

With all these the reagent at once forms a dense, bulky, white precipitate. This precipitate is not redissolved on boiling, except in the case of an albumose or peptone. The precipitate is readily soluble in a dilute alkali, provided a sufficiency of the alkaline solution be added. It is not soluble in weak acids, nor in strong acids unless a large quantity of strong acid (such as nitric) is added.

The method of testing is as follows: Take a small amount of urine (for example, 20 minims), preferably in a very small test-tube, and add a drop or two of a *saturated* watery solution of the reagent. If the urine is strongly alkaline an extra drop or two of the acid should be added, and if no opalescence or precipitate occurs it is well to test the reaction with litmus, and make sure that the urine has been made strongly acid. On adding the reagent, shake the tube quickly, so as to mix its contents; then examine at once. The occurrence of an opalescence or cloudiness immediately or within a very few seconds (say two or three) is a test for proteids, intermediate in delicacy between the cold nitric acid test, on the one hand, and the acetic acid and heat test (under favorable circumstances), on the other. The development of an opalescence some time after (for example, one-half to two minutes) is a more delicate test than even acetic acid and heat, and shows the presence of minute traces of proteid, which are probably insignificant from a clinical point of view, as a rule.

Next heat the tube to boiling-point. If the opalescence or precipitate is caused by the ordinary "albumin" commonly present in albuminous urine, it does not disappear on heating; but, on the other hand, becomes markedly flocculent. But if the precipitate or opalescence is due to the presence of

albumoses or peptones, it clears up on heating (before the boiling-point is reached) and reappears when the tube cools.

The author is satisfied from careful experiments, that—1, the precipitate is really a proteid one; 2, that it is always obtained when proteid is present in the various abnormal conditions of urine which may have to be examined; 3, that the precipitate cannot be caused by any other non-proteid constituent of the urine. Cloudy phosphatic urine clears adding the reagent.

Urine containing excess of urates gives no precipitate, nor does proteid-free bilious urine. As regards the presence of a large quantity of mucin this is not likely to prove a source of error. Moreover, it is probably only in the case of alkaline urine, when there is at the same time a marked irritation of some part of the urinary passages, yielding a greatly increased mucous secretion, that the amount of mucin in the urine can be sufficient to come into question at all. But in such conditions of the urinary tract the detection of a trace of albumin is probably of no significance. Normal urine gives no reaction with salicyl-sulphonic acid.

SURGERY.

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RELAPSE OF HERNIA AFTER VARIOUS OPERATIONS FOR RADICAL CURE.

Since BULL has had a more extensive experience with the radical cure of hernia than any other surgeon of this country his utterances upon this subject bear great weight. During the past three years, aided by his assistant, DR. S. E. MILLIKEN (*New York Medical Journal*, vol. liii., No. 22), he has carefully examined the histories of patients applying to the Hospital for Ruptured and Crippled in the hope of furnishing some statistical evidence of the value of different methods of radical cure of hernia. The tabulation made of relapsed cases numbers 119. In 73 cases the method of operation was definitely ascertained.

The average age in all the methods was about the same—from thirty-eight to forty-four years—showing that the extremes of life generally have been avoided. The duration of treatment, practically wound healing, in Czerny's method, where the pillars of the external ring and the integuments are carefully sutured, is almost as great as in the open method. This is an argument in favor of allowing the wound to granulate. It is particularly noteworthy

that relapses occurred as late as two years and six months, and three years and four months, and that, on an average, no method shows immunity from recurrence for a longer period than fifteen months. This warrants the statement that future evidence as to the value of different methods must cover an experience of more than three years, and patients who have been without a recurrence for a year have no reason to expect to remain so permanently.

In one table eight cases are given, presumably operated on for radical cure, since the herniæ were reducible, and the operations were performed in the last five years. Relapse ensued after an average period of twenty-four weeks.

The next table gives twenty cases of irreducible strangulated hernia subjected to operation within eight years, without any data as to method. A radical cure may or may not have been attempted. Relapse occurred, on an average, in eighteen months.

These cases certainly demonstrate that many methods are defective and likely to prove disappointing if observed for a sufficient length of time.

Since ten years have elapsed since the modern operations have been in vogue there should be patients who have been more than five years without relapse. Some such patients could naturally be expected to appear at hospitals; no such records are present.

In the hospital books are recorded 46 patients who have been subjected to radical operations, and who present no sign of relapse, and who have been furnished with trusses; of these, only 5 have been under observation for three years, 8 for less than two years, and 32 for less than one year.

In a series of 136 radical cure operations reported by the author a year ago, there were only 4 cases that had been over four years without recurrence.

Eighteen cases are tabulated which were operated on for irreducible strangulated hernia, and in which no attempt at radical cure was made. This latter fact was ascertained from the date of operation (prior to the introduction of modern methods), or was known from the statement of the operator. The patients averaged 45 years. The period at which the relapse occurred varied from one month to 23 years, and was on an average 5 years. It is noteworthy that of 15 of these cases all wore trusses from the time of operation.

The author is not prepared to offer any statistical data bearing on the question of trusses preventing relapse or prolonging a cure. He states in general that the largest and most voluminous protrusions were met with in patients who had worn no truss; and furthermore, he had never seen any evidence of damage to structure by the pressure of the truss. In his own practice he always has his patients fitted with a truss immediately after the wound has healed, and directs that the pressure shall be very slight—that is, shall merely support the parts. Much that has been said against trusses can be laid to the score of the operation, and the condition that the parts are left in by it rather than to the truss. If suppuration is prolonged in the wound, and it is compelled to heal by granulation, a cicatrix of less vitality and less elasticity than the normal skin and subcutaneous fat is left. This structure is not tolerant of pressure. A primary union which restores the parts as nearly as possible to their normal condition will not be unfavorably affected by the truss. On the other hand, in a wound with much cicatricial tissue there is

a natural tendency to softening and yielding, and this tendency should be hastened by the pressure of the truss without and the viscera within.

In cases treated by the open method the orifice of the relapsed hernia is not unlike that of ventral herniæ—that is, an opening in the wall without any canal, so that the hernia protrudes directly forward. This condition makes greater difficulty in the adaptation of a truss, which is further enhanced by the thinness of the yielding cicatrix. Although at first the cicatrix of the open operation can be recognized by its depressed situation and firm, contractile, tense character, at a later period it begins to yield in places or all along its line, and ultimately presents the features just mentioned.

Although these patients are not cured, the majority are certainly improved. They find much satisfaction in the fact that the protrusions are not so large as before operation; they experience increased comfort and security in the wearing of a truss. The author states that the figures given do not afford any valuable evidence as to the comparative reliability of different methods, but only emphasize the lack of promise to effect a cure. He believes that it is still wise to continue to strive for better methods. He advises that the term cure should be dropped, and the value of given procedures should be estimated by the relative proportion of relapses. That plan will be judged best which shows the smallest number of relapses in the course of the longest period of observation; such period should be at least five years. He further believes that all procedures should be so devised as to insure prompt healing of the wound, and that the support of a truss should be insisted on from the time the patient leaves his bed.

The Seat of Puncture in Paracentesis Abdominis.

Trzebicky (*Archiv für klin. Chirur.*, Bd. xli., Heft 4), in performing paracentesis abdominis at the point of election—that is, midway between the umbilicus and the anterior superior spine of the ilium—wounded a large bloodvessel which gave such troublesome bleeding that the life of the patient was threatened. The hemorrhage was arrested by compression of the common iliac artery. Incited by this experience, and by several reports of fatal bleeding following puncture at this point, Trzebicky conducted an experimental research upon a large number of cadavers. As a result of this he announces the following conclusions:

In the majority of cases paracentesis performed at a point midway between the umbilicus and the anterior superior spinous process of the ilium is perfectly safe, since neither the epigastric artery nor any large branch of this vessel is liable to be wounded. The artery commonly crosses this line at the junction of the inner with the middle third.

In a certain proportion of cases, however, the epigastric artery or one of its branches lies directly beneath the point of election.

The course of the epigastric artery is seldom exactly similar in the two sides of the body.

Since the artery runs within the sheath of the rectus muscle, its course depends mainly upon the position of this muscle. In case the two recti are separated by abdominal distention, the artery is displaced so that it lies very near the point of election for puncture. The rectus muscle does not,

however, bear a constant relation to the artery. At times, even though the muscle is displaced to the side, the artery lies near the middle line.

Variations in the origin of the epigastric artery seem to have no influence on the course of the former vessel.

The artery is usually accompanied by a single vein.

Paracentesis abdominis should be performed either in the linea alba or in the outer half of the line joining the umbilicus and anterior superior iliac spine. In case the linea alba is selected, it is not important to keep strictly in the middle line, since there is an arterial branch which may be wounded if the trocar is entered, even slightly, to one side.

Catgut Infection in the Dry Treatment of Wounds.

Klemm (*Archiv für klin. Chirur.*, Bd. xli., Heft. 4), on adopting the dry treatment of wounds, employed catgut as the material for placing buried sutures, and was surprised to observe as a result that abscesses developed at the site of operation much more frequently than was the case when he employed silk alone as suture and ligature material. At first this was attributed to some carelessness in operative technique, but even after the minutest observance of every precaution suppuration still occurred. For the first few days after operation there was no fever, no local pain or tenderness. On the sixth day, when the silk sutures were removed (the wounds were not drained), there seemed to be healing without disturbance by microörganisms. On the eighth or tenth day there was an elevation of temperature and swelling and tenderness in the region of the wound. On tearing open the latter an abscess was found, which, without exception, was found in the deeper part of the incision, where the catgut had been placed. The catgut employed was prepared by repeated washings in five per cent. alcohol-sublimate solutions until the latter showed no turbidity. The catgut was then stored in absolute alcohol, from which it was not taken until it was needed for use.

To determine whether this method of preparation rendered the gut sterile, a great many culture experiments were carried out. They all showed that the catgut thus treated was germ-free. Klemm next implanted in the deep tissues of dogs catgut prepared as first described and portions of sterilized silk of corresponding sizes. Examination some days later showed septic inflammation about the catgut implantations, whilst the tissues about the silk were in a normal condition. Culture of the catgut showed countless colonies of microörganisms. In the silk there were either none or very few.

From these experiments it is evident that catgut can be surely sterilized, but that, even though itself germ-free, it greatly favors infection of wounds. This infection, of course, takes place during operation, since it is almost impossible to keep a wound absolutely germ-free. The few germs which thus gain access find a favorable medium in which to grow in the softening, non-resistant catgut.

Bottini's Method of Treating the Enlarged Prostate.

Morrotti (*British Medical Journal*, 1891, No. 1586) describes Bottini's method of treating enlarged prostate by means of the galvano-cautery. This method is designed to remove or lessen the mechanical obstruction to the

outflow of the urine. To accomplish this a special instrument has been devised. This consists of an incisor apparatus and a battery. The former is a catheter-shaped metal tube, the lumen of which is divided into four separate compartments; two of these are for the conducting of electric wires, the other two are channels for the passage of a stream of cold water, which runs to the distal extremity of the instrument, thus preventing it from becoming over-heated. The conducting wires end in a cautery knife, which, when heated to a dull red, is applied to the hypertrophied tissue. This knife can be screwed backward and forward, and can be completely shielded by the curved point of the instrument.

In performing the operation the patient's urethra should be habituated to the use of the instrument before cauterization is attempted. Anæsthesia is not always necessary. Water need not be injected into the bladder unless this viscus is quite empty. The patient is placed in the lithotrity position and the instrument is used in the usual way. When the point is in the bladder it is turned downward, and is then drawn forward so as to cause the beak to hitch against the prostate and bring the cautery into contact with the part upon which it is desired to act. By exposing the knife, connecting the current, and gently elevating the handle of the instrument, the point is made to burn its way slowly through the prostate. When the sound of burning is heard the point should be moved backward and forward until the projecting lobe is completely divided. The knife should be allowed to cool; should be returned to its sheath; the instrument should then be passed into the bladder, and should finally be withdrawn.

Bottini has operated in this manner in 57 cases, with 3 deaths. In 32 cases a perfect cure was effected, in 11 there was improvement, and in 12 the result was *nil*. If the hypertrophy is only moderate the obstructing lobe should be entirely destroyed. In advanced cases the surgeon should be content with tunnelling a passage. Both these procedures are contra-indicated if kidney disease is present.

Rupture of the Urethra From Distention.

Bazy (*La Semaine Méd.*, 11 Ann., No. 14) has conducted a number of experiments to determine which portion of the urethra is most prone to rupture when this canal is forcibly distended. In the great majority of cases the urethra gave way at its bulbous portion, though in a certain proportion of cases the tear involved both the bulbous and membranous urethra. In the latter case the resulting effusion was poured into the rectum. In the exceptional cases, when the membranous urethra alone was involved, the extravasation was, of course, found in the space of Retzius. The ruptures were always on the floor of the urethra, or on its lateral walls. From this it follows that in case of tight stricture, even though the lesion is located in the penile portion of the urethra, if rupture takes place this is commonly located at the bulb.

In this relation the author again calls attention to the fact that terminal bleeding, that is hemorrhage following urination does not necessarily originate from the bladder, or from the neck of the viscus. Slight rupture of the anterior urethra may readily occur from the impact of the urine; espe-

cially is this the case when there is contraction of some part of the passage. The blood being mingled with a large quantity of water is not noticed at first. As the volume of the stream of urine diminishes it becomes more distinctly colored, till finally pure blood drops from the meatus. This form of hemorrhage must be diagnosed from that which originates in the bladder, as the latter is often of serious diagnostic import. The urethral hemorrhage is attended with burning, but is not marked by the straining and sensation of something that is left in the bladder which marks inflammation or disease of the latter organ.

OTOLOGY.

UNDER THE CHARGE OF

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The Affections of the Ear in Tabes Dorsalis.

Dr. Leopold Treitel, of Berlin, has made a careful examination of the ears in a number of tabetic cases, and his conclusions are as follows (*Archives of Otology*, vol. xix.): In five cases of tabes, where the hearing was affected, only two the author considers as probably due to an affection of the auditory nerve. Careful study leads him to the conclusion that not only the perceptive apparatus of the ear, but also the conducting apparatus is affected. In one case, at least, there was reason to believe that changes had occurred in the mucous membrane of the tympanic cavity, "which depend on a retrograde metamorphosis, and may also be called sclerosis."

The author concludes that particular trophic fibres of the fifth nerve must be diseased, which may be affected alone, or together with sensory fibres. In one case trophic changes in the tract of the fifth nerve and the glosso-pharyngeal nerve were observed—two nerves which send branches to the tympanic cavity. From numerous observations Treitel is inclined to believe that "sclerosis of the posterior columns of the cord not rarely causes trophic changes in the middle ear, which may lead to disturbances of hearing." Such changes might be found frequently, if looked for, at necropsies. A number of facts seem to indicate the development of sclerotic changes in the middle ear from a tabetic cause.

It is fair to suppose that the aural affection is due to the tabetic disease, "when the disturbance in hearing is first noticed after the undoubted beginning of the tabes, no aural disease having previously existed, provided that the otological examination corresponds to the clinical history." The author cannot confirm the statement of Gradenigo,[1] "that especially in cerebro-

[1] The American Journal of the Medical Sciences, Nov. 1890, and Archives of Ohrenh., vol. xxx., 1890.

spinal diseases with amblyopia or amaurosis, an (electric) excitability of the auditory nerve is found."

So-called paradoxical conditions of hearing in deafness from tabetic or central causes, "where a screaming voice is heard only very near the ear, and the sound of the words, without the detail of the articulation, is still perceived, and even the scratching of a pen, the striking together of two metal pieces, etc.," are not admitted to exist in deafness from central causes alone, as they are often found in deafness from other causes, as, for instance, in sclerosis. In two patients with marked lessening of pain- and touch-perception on one side, no difference was found in the sound-perceptions of the two sides. "Whether for the producion of this condition a lessening of all the sensibilities is required is very questionable."

Chataigner's[1] conclusions are thus quoted: "The disturbances on the part of the ear (in tabes) may be of varying intensity. They are caused by a hyperæmia of the labyrinth, which may depend on a direct irritation of the auditory nerves, which extends from the centre toward the periphery, or of other nerves which exercise a vasomotor influence on the vascular system of the ear." The deafness in the former case may be total, in the latter partial. The disturbances in hearing may be the first symptom of the tabes." This view as to vasomotor influences leading to trophic changes in the middle ear harmonizes with that of Treitel.

Noteworthy Changes in the Nasal Mucous Membrane in a Case of Leukæmia.

Suchannek, of Zürich, has examined post-mortem the nasal mucous membrane in leukæmia. The mucosa of both the respiratory and of the olfactory portion showed color entirely different from the normal one. Usually the respiratory portion is pinkish, in the olfactory region yellowish intermixed with pink. The leukæmic membrane, however, had a moist, glistening appearance, and possessed throughout its inferior part, up to the middle turbinated bone, a light yellowish-brown; the upper portion, including the olfactory fissure, the superior turbinated bone, the part below the ethmoidal plate, the corresponding portions of the septum, *a dark-brown color*. The mucous membrane was also decidedly thickened throughout its whole extent. Microscopic sections showed lymphomatous nodules in the turbinated bodies, on the septum, and especially in the nasal roof. Normal olfactory epithelium was found—accompanied, however, by a total destruction of the glandular apparatus.—*Archives of Otology*, vol. xix.

Cholesteatoma, Perforation of Shrapnell's Membrane, and Occlusion of the Tubes: an Etiological Study.

Bezold, of Munich (*Archives of Otology*, vol. xix.), under the above title contributes one of the most instructive and interesting papers it has been our good fortune to read. It has long been a question how concentric epidermic masses originate in the attic, antrum, and mastoid region. Virchow has thought that cholesteatoma might originate at these points by "an epider-

[1] Thèse de Paris, 1890.

moidal transformation of the mucous membrane of the middle ear," but this idea is "annihilated by the very localization of these tumors," which, up to this time, he has never found actually within the tympanic cavity itself. Bezold maintains that epidermic cells gain access both to the atrium and the attic of the tympanum, and thence into the antrum and the mastoid cells, from the external auditory canal through perforations in the membrana tympani.

"The moment that the sharp distinction between the cutis and the mucous membrane has once been lost by destruction of the surface of the membrana at any spot, we see the cutis of the remaining intact region gain the ascendancy over the mucous membrane, and extend with much greater rapidity over the entire district." Thus, when the membrane is entirely broken down, an epidermic layer from the skin of the external auditory canal may extend even into the mastoid cells (Schwartze). It appears that a favorite port of entrance of epidermic cells into the attic is through perforations in the flaccid membrane, above the short process.

Bezold then considers the origin of attic suppurations and perforations in the flaccid membrane.

It has always been difficult to say how suppuration in the attic, with perforation in the membrana flaccida only, originates. It was once supposed to come about like suppuration of the atrium of the tympanum, viz., through the Eustachian tube. But this has always been far from certain. Bezold rejects this latter theory, as does Walb (*Archiv. f. Ohrenh.*, vol. xx. p. 185, etc.), and he believes, with Walb, that purulent infection of this attic space in the tympanic cavity enters from the *external meatus, partly in the form of an otitis externa, with ulceration at the margin of Shrapnell's membrane*, and partly through a persistent foramen Rivini. This theory is strengthened by the fact that we often find evidences of closure of the Eustachian tube in cases of chronic purulency of the attic with perforation of the flaccid membrane.

Treatment.—It is maintained by the author that occasionally spontaneous cures occur in these cases. The surgeon's task, it is claimed, is either to enlarge the orifice into the attic by removing the upper bony margin of the perforations in the meatus, or by extraction of the malleus and anvil, or, thirdly, by making a new opening into the antrum. Entire removal of the epidermic (neoplastic) lining of the drum cavity is impossible.

Topography of the Normal Human Tympanum.

At the suggestion of Professor Blake, of Harvard Medical School, Dr. William S. Bryant, of Boston, has examined a number of temporal bones with special reference to the reduplications of the mucous membrane lining the tympanic cavity. Not one of the tympana examined—over one hundred—was free from these folds, and in several instances they occupied the whole cavity of the tympanum above the ossicles.

These folds are arranged by Dr. Bryant in three groups: 1. Those of the mastoid antrum, in which there is usually a central longitudinal band, with radiating lines and trabeculæ. 2. Those attached to the malleus and incus radiating from the three long axes of the bones. 3. Those of the stapes and round window, and the neighboring tympanic wall. "The mucous folds

about the stapes join the crura together or connect the stapes with the walls of the pelvis ovalis. The mucous folds which are attached to the ossicula perform essentially the function of the ligaments, binding them together, or to the walls of the tympanum; and for this reason they might be classified as ligaments."

The article is accompanied by fifteen colored engravings, showing very graphically the results of Dr. Bryant's great industry in the study of these important structures in the drum cavity.—*Archives of Otology*, vol. xix.

Reduplications of Tympanic Mucous Membrane.

Under this title Dr. Clarence J. Blake, of Boston, draws attention to a series of important pathological conditions in the middle ear, and the results of their formation, upon the hearing (*Archives of Otology*, vol. xix. p. 213). As an important factor in the persistence of chronic suppurative disease of the middle ear, and also in the effects which that and various other non-suppurative diseases have upon hearing, Dr. Blake considers certain folds, bands, or reduplications of mucous membrane in the upper and posterior part of the drum cavity. These impair the mobility of the chain of ossicles, and of its complement, the membrane of the round window. These folds are divided into, first, a horizontal set, which impair drainage from the attic, and a vertical set, which are disposed around the stapes and the round window. This second class is important, because they interfere with the mobility of these essential parts of the conducting apparatus of the ear. A third set is described as striæ or reduplications, chiefly the former, in the neighborhood of the mastoid antrum. The two first are considered of most clinical importance. They exist normally in about 70 per cent. of all human ears, and are not to be considered pathological in themselves. Aside from an obstruction to drainage from the attic, the first class of reduplications "may be considered as playing an important *rôle* in the etiology of those diseases of the tympanic attic the majority of which start with a suspension of vasomotor inhibition in that region."

When a suppuration has been established, the presence of the mucous folds of the first class—the horizontal ones—may become an interference to free movement on the part of the ossicles after the suppurative process has closed.

The thickening and adhesions of the folds of the second class, viz., those about the stapes and neighborhood of the round window, interfere with the motility of these important parts. In cases where the membrana tympani is largely perforated, with spontaneous evulsion of the incus, "the considerable impairment of hearing, due to the immobility of the stapes from the adhesions and thickening of their mucous folds, an immobilizing effect still further increased by the unrestricted action of the stapedius muscle, has been improved by the division, first of the tendon of the stapedius, and then of these folds."

Dr. Blake thinks that in any case of chronic *non-suppurative* disease of the middle ear the operation of excision of the membrana tympani and evulsion of the malleus and incus is not necessary until other means are tried, as the stapes can be freed in some cases "by a division of the incudo-stapedial

articulation and tenotomy of the stapedius through an opening in the posterior portion of the membrana tympani sufficiently large to permit ready access to the stapes and round window."

Hemorrhage into the Labyrinth, in Consequence of Ordinary Anæmia.

The same observer records also a case of the above-named character (*Ibid.*). This case was examined only during life. A young woman, twenty years old; four years previously had suffered from anæmia, with hemorrhages into the stomach, intestinal canal, and retina. At the same time the hearing, previously perfect, became affected without any known cause, and also there ensued tinnitus aurium and vertigo. The anæmia gradually disappeared, the eyesight was restored, and the hearing became better, but not perfect. The vertigo and tinnitus aurium also ceased. Examination lately by Dr. Habermann revealed nothing abnormal in the membrana tympani nor in the naso-pharynx. It was concluded that at the time of the hemorrhages into the stomach, intestinal canal, and retina, there also occurred a hemorrhage into the labyrinth.

DERMATOLOGY.

UNDER THE CHARGE OF

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Treatment of Anthrax by Carbolic Acid.

Poteenko (*The Practitioner*, 1890), praises the treatment of this disease by the parenchymatous injections of a ten per cent. solution of carbolic acid. Four severe cases were successfully treated, three or four Pravaz syringefuls of the solution being injected, once daily, into the swelling and surrounding tissues. The parts were kept covered with a dressing soaked in a five per cent. solution of the same remedy. A few days sufficed for the relief of the fever and other symptoms of systemic infection.

Aristol and its Uses.

Egasse (*Bull. gén. de Thérap.*, 1890) thinks that its value in lupus has been overestimated. Neisser claims that it is not antiseptic. Observers are generally agreed that as an application to wounds it may well replace iodoform. It is especially useful in simple and varicose ulcers. In psoriasis its action

is said to be as certain as chrysarobin, than which it acts slower and produces no irritation, and not much staining of the skin or clothing. It may be employed as a ten per cent. flexible collodion or ointment.

Traumatic Herpes Zoster.

Janin (*Brit. Med. Journ.*, vol. ii. p. 527, 1890) reports a case of this disease in a healthy boy aged fourteen years, which originated in a painful prick of a thorn in the shoulder. The puncture healed, but the site remained painful, the pain gradually spreading over the whole side of the back and chest. Eight days after the accident an exceedingly painful attack of herpes zoster appeared, occupying the third, fourth, and fifth intercostal spaces, and extending from the vertebral column to the sternum.

Thiol in Skin Diseases, especially Dermatitis Herpetiformis.

Schwimmer (*Wiener klin. Wochenschr.*, 18, 1890) recommends thiol in the treatment of erythema, dermatitis herpetiformis, herpes zoster, acne rosacea, acne, papular and moist eczema, and burns; used generally in an aqueous solution 1 to 3. It proved especially useful in a case of dermatitis herpetiformis which had resisted other remedies. In erythema multiforme the remedy in powder form seemed preferable. The liquid form was best adapted to papular eczema. It is said that there is no unpleasant odor.

Treatment of Urticaria by Iodide of Potassium.

Stern (*La Semaine Médicale*, 1890) has treated five cases successfully, four of them being more or less chronic and rebellious to all previous treatment. None of the patients were either syphilitic or asthmatic. In one case, of four months' duration, the itching disappeared on the second day of treatment, and the cure was completed after two and a half drachms of the remedy had been taken. In two cases (one acute, the other chronic) the itching was at first increased, but a successful result was obtained in each case after the administration of seventy-five grains of the drug.

Dermatitis as an Excretionary Symptom.

Walsh (*Medical Press and Circular*, 1890) considers this subject and endeavors to show that excretory irritation is a not uncommon factor in inflammations of the skin. The conclusions arrived at are that—(1) Dermatitis may be set up in a certain number of cases by the excretion of irritant products from the system. (2) The irritant may be chemical or due to microorganisms. (3) That many of the inflammations of the hypo- as well as of the epiblastic tissues are simply expressions of excretory irritation. (4) That the severity of the inflammation and its result is in proportion to the specific action of the irritant on excretory epithelium. (5) That excretory parallels may be drawn between drugs and specific disease poisons, both as regards their harmfulness to epithelium and their channels of elimination. (6) Excretion not only affords a key to a certain number of skin inflammations, but

also accounts for the success of many well-established methods of treatment which aim at changing the channels of elimination.

Scarification in Keloid and Hypertrophic Cicatrix.

Vidal (*Annales de Derm. et de Syph.*, No. 3, 1890) states that not only the keloid, but also the cicatrices made by the scarifications for the cure of the keloid disappear. The treatment of large tumors lasts for several months, while for recent growths six or seven operations may suffice. The scarifications must be continued until the cicatrix is supple and thin, and until all signs of induration have disappeared, otherwise the growth will re-form. The scarifications should be made at a distance of two millimetres, be cross-hatched at a right angle or obliquely, square or lozenge-shaped, and should penetrate through the depth of the keloid and not extend more than two or three millimetres beyond the margin of the growth. Local anæsthesia, produced by the application of liquefied chloride of methyl, is employed, the part being painted until whitened by freezing. As soon as the natural color inclines to reappear, a second, or even a third application should be made. By these successive applications the anæsthesia penetrates more deeply, and the scarifications cause only a very moderate degree of pain. The loss of blood is not much, being controlled by absorbent cotton. On the first day this is steeped in a solution of boric acid, and the next day the growth is dressed with a piece of *emplastrum de vigo*, and renewed twice daily. The action of the mercurial has been found favorable by the author.

The Treatment of Rodent Ulcer with Resorcin Plaster-mull.

Boeck records briefly (*Monatshefte für praktische Dermatologie*, Bd. xii., No. 4) two cases of rodent ulcer treated successfully with the plaster-mull of resorcin (Unna's formula). In the one case, a man aged seventy-two years, the lesion consisted of an ulceration of one and a half inches in diameter, situated on the cheek; in the other case, a patient aged eighty-two years, the ulcer was seated upon the temporal region. The plaster was kept constantly applied, a fresh application being made daily. Favorable change was to be noted from day to day, the time required for a satisfactory result varying from two to several weeks.

Pediculosis Pubis.

In a clinical lecture (*L'Union Médicale*, February 26, 1891) on pediculosis pubis, Fournier very properly decries the treatment of this condition with blue ointment, inasmuch as this method is not only dirty and otherwise offensive, but it commonly gives rise to the so-called eczema mercuriale, and may also, through absorption, bring about moderate or severe ptyalism. Much preferable and equally efficacious are—an ointment of calomel, 1 to 20; baths of corrosive sublimate; a lotion consisting of 400 parts of water, 100 parts of alcohol, and 1 part of corrosive sublimate; and one consisting of 300 parts of vinegar and 1 part of corrosive sublimate, to be applied diluted with one or two parts of water. As to the removal of the ova, the same method is to be

practised as in pediculosis capitis—that is, with washings of warm vinegar, slightly diluted, and subsequent combings.

Lepra at Hanoi (Tonquin).

Boinet (*Revue de Médecine, Medical Chronicle*, 1890) finds that the disease exists along the watercourses, and that mud is a probable carrier of infection to the naked feet of the poor, the earth being impregnated by the sputa, crusts, and discharges from the lepers. The soil of the cemetery of Hanoi was found to be highly charged with the bacilli, the mode of burial being extremely careless. Native physicians scarcely acknowledge heredity. In the eighty cases examined, absence of heredity was found in sixty-one. The chiefs of the villages, forty years resident, deny having seen any case directly transmitted; nor are they themselves afflicted. Healthy young girls marry lepers and fail to contract the disease. A case is given in which grandfather and grandmother are lepers, while the father and five children, who have constantly lived in the community, have escaped. The eighty cases establish the *possibility* of direct contagion in fifty-one. Children of lepers removed soon after birth to an unaffected district remain free from the disease, while their brothers and sisters living in the leper community contract it. Such children, returning in adult life to the community from which they sprang, presently develop symptoms. The theory of the infection by means of the mosquito is regarded as being by no means impossible. The bacillus can find entrance into the mosquito, and has been found in human blood.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Carcinoma of the Larynx.

The clinical history of a carcinoma of the larynx is well exemplified in the record of a case under the care of Dr. Max Schaeffer, of Bremen (*Deut. med. Woch.*, No. 28, 1890). A man, fifty years of age, several of whose immediate relatives had perished with carcinoma, had suffered with psoriasis for twenty-eight years, with laryngo-tracheal catarrh for twenty-five years, and with hoarseness and soreness in the left half of the larynx for ten years. At the end of these periods, June 3, 1885, he was still well nourished and in good general health. His larynx showed slight infiltration and paresis of the left vocal band, with infiltration of both ventricular bands and of the left aryepiglottic fold. His respiration was somewhat weaker on the left side than on the right.

Under topical treatment these conditions subsided almost entirely during the course of the year. In October, 1885, a corneous granulation was noted for a while in the anterior third of the left vocal band, but it soon disappeared. February 2, 1886, only infiltration of the left ventricular band and paresis of the left abductor muscle were to be noted. November 13th, the left vocal band was so much hidden as to appear only as a projection the thickness of a catgut ligature. Eight months later, July 13, 1887, the voice was completely hoarse. There was a smooth infiltration of the left ventricular band fully over-covering the vocal band. At this time the diagnosis of sarcoma was made. December 13th, the infiltration was greater, and covered the orifice of the ventricle as well as the vocal cord; the left ary-epiglottic fold was somewhat infiltrated and looked œdematous. A month or so later, June 29, 1888, the infiltration had extended forward and had crossed the anterior commissure of the glottis to the opposite side, and the left side of the epiglottis appeared somewhat thickened and turned toward the right. The movements of the left half of the larynx were somewhat more sluggish than those of the right side. The patient complained of a sense of tension in the entire throat, and of difficulty in deglutition. Unilateral exsection of the larynx was now advised but refused. In September the vocal band had become visible and was exulcerated anteriorly and posteriorly, and a uvula-like tumor had become developed at the base of the epiglottis toward the right side. In October there was some bloody expectoration; some fœtor from the mouth; glutition of food was off-and-on painful; and the tumor at the anterior commissure had enlarged. The left arytenoid region seemed somewhat excoriated through the pressure of the tumor. The pus seemed to escape from an abscess cavity beneath the left vocal cord. Pressure over the left thyroid cartilage elicited lancinating pains extending toward the ear.

On November 8th, after performing a preliminary tracheotomy, and occluding the trachea, Dr. Hahn, of Berlin, split the larynx and found the region of the ventricular and vocal band of the left side transformed into a whitish-gray tumor composed of a smaller portion anteriorly in the median line and coalescent with a larger mass in the centre of the left side. The growth was not eroded and appeared to be fully circumscribed. It was removed by incision into the surrounding healthy tissue one-half to one centimetre from its borders, and the lower portion of the thyroid cartilage was also excised after separation of the external soft tissues with a raspirator. The wound of incision and the cavity of the larynx were firmly tamponed with iodoformed gauze which was secured with sutures through the integuments.

The patient did well for about a year. Then recurrence took place, and fifteen months after the excision, the new growth presented much the appearance of the first one at the period of the operation, and was rather more extensive.

June 6, 1890, a low tracheotomy became necessary; and the patient at last report was wearing a large-sized canula with comfort, with great improvement in respiration and with improvement in speech, but deglutition was very little bettered, inasmuch as the growth had extended into the left glosso-epiglottic fold.

The chief point of interest in this case is the slow development of the carcinoma, which for a long time obscured the diagnosis.

Fractures of the Larynx and Trachea.

At the time the compiler prepared the article on this subject for the *International Encyclopædia of Surgery*, but two cases of recovery after fracture of the cricoid cartilage appeared to be on record; the cases of Treulich and of Masucci. Two additional instances have recently been recorded. One occurred under the observation of Dr. Alfred Sokolowski, of Warsaw, which is reported (*Berl. klin. Woch.*, 1890) with many interesting details, especially in reference to its laryngoscopic phases.

A country girl, twenty years of age, wearing an apron over her shoulder and tied in a knot around her throat, after the fashion of the country, got the apron caught in the driving-wheel of a hay-cutter. Pain in the laryngeal region and dyspnœa were immediate, and were soon followed by severe cough, which continued for several hours, and was attended with expectoration in which was a good deal of blood. On the following day Dr. Sokolowski and his colleague Bukowski found her with cyanotic and œdematous visage, severe dyspnœa with respiration interrupted by severe stridulous cough, hoarse voice, and speaking with difficulty in a barely recognizable whisper. Considerable purulent sputum was expectorated with the cough. The entire neck was greatly swollen, and subcutaneous crepitation was felt in every portion on palpation. A deep vertical depression was felt in the left thyroid cartilage, pressure upon which produced pain and decided sensations of crepitus. Laryngoscopic inspection revealed a moderately swollen and congested epiglottis, beneath which two thick reddened projections were seen corresponding to the upper borders of the thyroid cartilage and occluding the interior of the larynx. Tracheotomy was at once performed by Bukowski. A perforation into the interior of the larynx was found occupying the lower angle of the thyroid cartilage, and due to comminuted fracture of the thyroid cartilage and of the anterior portion of the cricoid cartilage. This opening needed but slight enlargement downward to permit a large canula to be readily inserted through it. Two small fragments of cartilage became detached during the operation. Although recovery ensued, the patient has been unable to dispense with the canula. On performing laryngo-fissure to determine the cause of stricture, it was found that the entire cricoid cartilage had disappeared, and that what appeared in the laryngoscopic image to be the posterior wall of the larynx was in reality the anterior wall of the lower portion of the pharynx.

Dr. C. M. Desvernine-Galdos, of Havana (*Rev. de Ciencias Médicas* and *Annales des Mal. de l'Or., du Lar.*, etc., 1880), reports a case of laryngo-tracheal fracture, survived for several years, in which the vocal bands became united almost their entire length, only a space of two centimetres being preserved anteriorly, and in which the ventricular bands vicariously acquired the function of phonatory bands. The accident was produced by a fall from a trapeze upon a stove, an angle of which was struck directly by the chin and the larynx successively. Some bloody sputa were immediately expectorated, but dyspnœa did not take place for a number of days. There

was no emphysema and no dysphagia. The larynx was flattened and deviated to the left side. Pressure over the thyroid cartilage provoked pain on the right side. Laryngoscopy revealed hyperæmia of the epiglottis, arytenoepiglottic folds, and the entire superior portion of the larynx, with infiltration more marked on the right side, and infiltration of the vocal bands and the arytenoid region. Tracheotomy was performed. The deep fascia had barely been incised when air escaped, denoting the existence of a fracture. The trachea was found flattened, with lateral fracture of three or four of the upper rings. The moment the canula was introduced sudden emphysema of the neck and face ensued, which gradually extended to the arms and trunk, in consequence of the frequent expulsion of the canula, which was too short. A special canula was introduced the day following, and the emphysema disappeared completely the eighth day.

Dr. Desvernine saw the patient for the first time late in 1887, when he was suffering with advanced pulmonary tuberculosis. The canula had been dispensed with for three or four years, and he breathed through a permanent infundibular fistule barely five millimetres in its exterior diameter. He spoke with effort in a bass monotone extremely limited in modulation.

The entire peri-laryngeal and laryngeal regions were normal, except that the vocal bands were completely in adhesion save for a minute orifice at their thyroidal extremities. The free borders of the ventricular bands formed an ellipse, the borders of which became approximated in phonation by a movement of elevation upon an accentuated convex plane. This phonatory function of the vocal bands had been observed at intervals during the long period of seventeen years. Operative interference to separate the vocal bands was declined. The patient died in 1888.

The autopsy disclosed that there had been a fracture of the thyroid and cricoid cartilages and of the upper four rings of the trachea; the solution of continuity of the cartilages having been complete. This explained the inability of retaining the short canula at the tracheotomy, the incision of which, parallel to the line of fracture, had partially liberated a band of elastic tracheal tissue three millimetres in length, which acted as a lever to drive the canula outward.

The ventricular bands had undergone development to double their ordinary thickness, their muscular fibres, as well as those of the aryepiglottic folds, being the seat of a most accentuated hypernutrition. The cricoarytenoid articulations were solidly ankylosed. The muscular fibres concerned in abduction and adduction of the vocal bands, as well as those concerned in their transverse and longitudinal tension, were in an evident state of atrophic regression, without presenting any characteristics of neurogenetic atrophy.

Spasmodic Tic of the Soft Palate.

At a recent meeting of the Société Médicale des Hôpitaux (*Le Mercredi Médical*, 1890) M. Dieulafoy presented a subordinate officer, forty-two years of age, and in perfect health, who had for two years an extremely marked spasmodic tic of the soft palate almost isochronous with the beats of the pulse. The only complaint was that of a certain amount of constraint produced by the spasm.

OBSTETRICS.

UNDER THE CHARGE OF

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An Epidemic of Puerperal Fever.

This unusual occurrence in a well-conducted clinic forms the subject of an interesting narration by Döderlein, of Leipzig (*Archiv für Gynäkologie*, Band xl. Heft 1), whose contributions on the bacteriology of sepsis are familiar. Three cases of lymphatic infection by the staphylococcus pyogenes aureus and streptococcus pyogenes occurred, the focus of infection being suppuration beneath an ill-fitting glass eye in a patient's orbit. In some manner the midwife who examined her infected her genital tract and that of two others, one of whom died. By control experiments upon animals it was observed that the union of the two microörganisms produced an especially virulent infection. From the standpoint of treatment the intra-uterine douche is of value as soon as high fever announces the infection; if delayed, the microorganisms are beyond the reach of the antiseptic and the douche is harmful. It is given by Döderlein by inserting a Cusco's speculum, washing out the vagina with sterile water and inserting a glass douche-tube into the uterus, through which sterile water is allowed to run until it is seen that the flow is uninterrupted. A 2 per cent. creolin solution is then used to thoroughly douche the uterus. For the treatment of puerperal peritonitis, he advises absolute rest, ice to the abdomen, antipyretics, and opium. He believes that internal examination for diagnosis should be as infrequent as possible.

Rapidly Fatal Puerperal Infection.

As illustrating the rapidity of puerperal sepsis caused by infection with streptococci, Fritsch (*Deutsche med. Wochenschrift*, No. 16, 1891) describes the case of a patient on whom total extirpation of the uterus was performed during an epidemic of puerperal sepsis in the wards of the hospital. Death followed the infection in thirty-seven hours, the post-mortem revealing disseminated sepsis, with swarms of streptococci.

The Comparative Results of Hospital and Private Obstetric Practice.

At the recent meeting of the German Gynecological Society Dorhn (*Centralblatt für Gynäkologie*, No. 22, 1891) gave the results of the comparison of statistics of puerperal mortality in German hospital and private practice. Although more complicated labors occur in hospitals than in private practice, yet septic infection is less frequent and mortality from preventable causes is

less; this is due not only to antisepsis but also to the fact that hospital labors are conducted with less interference and with a better understanding of the phenomena of labor.

Gonorrhœal Infection in the Mouths of the Newborn.

Dohrn (*Ibid.*) has observed five cases where gonorrhœa in the mother has been conveyed to the infant's mouth. Ulceration and the deposit of membrane followed, in which gonococci were readily found.

Practical Results of the Examination of Mother's Milk.

In the *Archiv für Kinderheilkunde*, Band xiii. Heft 1, 2, Monti writes at length upon the practical results of the examination of the milk of the nursing woman. He has found that a specimen of mother's milk in which both specific gravity and percentage of fat are high (1030 to 1035 sp. gr. and 3 to 5 per cent.), and which shows little variation during lactation, is suitable to nourish a healthy infant. It should be observed that both these factors must be present, as excess or deficiency of fat may result from pathological processes; and on the other hand, increased specific gravity, with diminished fat contents, renders milk unfit for nourishment. Regarding the microscopic examination of the milk corpuscle, Monti observed such great and constant variations that he regards it of little moment as a means of diagnosis. Many of the factors commonly supposed to affect the quality of milk, such as age, number of pregnancies, and length of lactation, he found without influence. Menstruation rarely affects the milk of a robust woman; prolonged flooding and debilitating causes lessen the size of the milk corpuscles.

Complete Prolapse of the Pregnant Uterus.

A case of complete prolapse of the pregnant uterus at six months is reported by Berne (*Lyon Médical*, Nos. 14 and 15, 1891). The patient was pregnant for the fourth time, and had suffered for several weeks from the presence of the prolapsed uterus between her thighs. Difficult micturition and leucorrhœa had resulted. Replacement was easily effected and maintained by a tampon; pregnancy continued to a successful termination.

[We recently had occasion to note the remarkable tolerance exhibited by the pregnant uterus in a case of total prolapse at the fourth month in a working woman, who sought treatment at an out-patient clinic. Reduction was easily effected and a fairly good position maintained by a tampon, the mass of which was carded jute covered by cotton, the whole smeared with a lanolin-iodoform paste.—Ed.]

Soxhlet's Experience with Sterilized Milk, with Improvements in his Method of Sterilizing.

In the *Münchener medicinische Wochenschrift*, Nos. 19 and 20, 1891, Soxhlet, whose name is so closely allied with the sterilization of milk, gives his conclusions regarding its value, and suggests an improvement in the manner of sterilization. Milk is placed in bottles, the whole in a tightly covered pail containing water. Instead of corks, he closes each bottle by drawing over its

mouth a piece of sheet rubber, which is brought over the edge and secured by a rubber band which passes around the neck. The elasticity of the rubber allows air and steam to escape from the milk, while as the milk cools atmospheric pressure forces the rubber inward, closing the bottle. Milk is sterilized at boiling-point of the water in the pail for forty-five minutes. His experience leads Soxhlet to consider sterilized milk of great value, but not successful in all cases. Different sorts of milk can be sterilized with different degrees of success. The best milk is that of the ordinary meadow-fed cow; dry feeding (hay and grain) is not so good. The objections to sterilized milk lie in chemical changes affecting the emulsification of its fats, thus interfering with its digestibility. Good milk, when sterilized and kept closed, will keep several months.

[In common with American observers, Soxhlet recognizes the danger of contamination of milk by stable filth and bacteria from hay. Sterilized milk is far from being a perfect food, the gist of infant-feeding lying in careful study of each case, scrupulous cleanliness and regularity, the endeavor being to form a healthful appetite and gratify it.—ED.]

AN UNUSUAL COMPLICATION OF VERSION.

In the *British Medical Journal*, No. 1589, 1891, HELME describes an arm presentation in a primipara where the membranes had ruptured and uterine retraction had taken place. Version was unsuccessful until it was observed that the contraction-ring resisted the movements of the fœtal shoulder. The prolapsed arm was then pulled down and the whole fœtus was pushed up into the uterine cavity, when the version was readily accomplished. In an occipital presentation or an ordinary shoulder presentation, the fœtal body forms the segment of a circle which offers no point of lodgment at the contraction ring.

THE TREATMENT OF SUPPURATION DURING PUERPERAL SEPSIS.

The surgical treatment of puerperal sepsis complicated by suppuration is illustrated by a case reported by MOORE, of Victoria (*Australian Medical Journal*, 1891, p. 179). The patient was suffering from severe septic infection with peritonitis, the left side of the abdomen being especially dull on percussion and prominent. On opening the abdomen six pints of foul pus was evacuated; the uterus was near the umbilicus, the right upper portion of the abdomen being shut off from the abscess by adhesions. An opening was made posteriorly in the lumbar region and a drainage-tube was passed, and also one in front, at the lower end of the abdominal wound. Irrigation with boric acid solution was used. The patient made a slow recovery complicated by temporary retention of pus, on one occasion terminated by purulent expectoration.

At the recent meeting of the German Gynecological Society FRITSCH advised the following method of treatment for recent pelvic exudates of puerperal origin. Using a speculum, the operator locates the exudate and with tenaculum forceps draws the uterus downward and to the opposite side. An incision is then made into the most protruding portion of the exudate, a stream of sterilized water being directed upon the incision so soon as pus

comes. The opening is enlarged by the finger, the abscess emptied and irrigated, and the edges of the sac are stitched to the wall of the vagina. If needed, iodoform-gauze tampons are used. The best after-treatment is frequent irrigation; drainage-tubes should be avoided. If difficulty is experienced in determining the point of incision an exploring needle may be used. —*Centralblatt für Gynäkologie*, No. 23, 1891.

The Pathology and Treatment of Eclampsia.

Koffer and Kundrat report (*Wiener klinische Wochenschrift*, No. 20, 1891) the case of a young, strong primipara delivered spontaneously who was attacked by eclamptic seizures eighteen hours after delivery. Death occurred twelve hours later in marked cyanosis. At the autopsy Kundrat found hemorrhagic hepatitis, eclampsia having been caused by ptomaine poisoning of hepatic origin.

[A similar case was reported by Paultauf and Kundrat in 1888.—Ed.]

In 52,328 births, Löhlein (*Centralblatt für Gynäkologie*, No. 23, 1891) found 325 cases of eclampsia; average mortality 20 per cent. In discussing methods of treatment, Cæsarean section is indicated when dilatation is not sufficiently advanced to permit delivery, when the child lives and is vigorous, while other treatment fails to subdue convulsions, icterus supervenes, and respiration and heart action are threatened. Medically, he relies on heavy doses of morphine.

The Influence of Pregnancy upon Respiratory Metabolism.

Oddi and Vicarelli (*Lo Sperimentale*, Fascicolo No. 2, 1891), from an interesting series of carefully tabulated experiments, conclude that during pregnancy there is an increased consumption of hydrocarbons, derived from the waste of nitrogenous material resulting from fœtal nutrition and growth. This is observed in the study of the respired air during pregnancy with comparison of weight.

Tumors of the Placenta.

Alin (*Nordiskt medicinskt Archiv*, Häft 1, 2, 1891) describes three placental tumors observed in the obstetrical clinic at Stockholm. The cases in which the tumors occurred were in other respects normal pregnancies and labors. Alin finds that such tumors have nothing to do with the uterus or membranes. Most of them are fibro-myxomata, rich in vessels, resembling angiomata. They exercise no influence in most cases upon pregnancy or labor.

Ectopic Gestation.

An ovarian pregnancy is reported by Eberhart (*Centralblatt für Gynäkologie*, No. 24, 1891) in the person of a multipara three months pregnant, with symptoms of suppuration in the abdomen. The uterus was slightly enlarged, a tumor as large as a hen's egg upon the left of the uterus. When the tube and ovary upon that side were removed by laparotomy the tube was found occluded, and an ovarian abscess was present. The microscope revealed decidual cells in the wall of the abscess.

GYNECOLOGY.

UNDER THE CHARGE OF
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The Treatment of Pelvic Suppuration by Vaginal Hysterectomy.

Pozzi (reprint from *Gazette hebd. de Médecine et de Chirurgie*, 1891) opposes Péan's radical procedure, as recently recommended by Segond, who thinks that vaginal hysterectomy is preferable to abdominal section in cases of disease of the adnexa. The arguments advanced in favor of the former are the lesser danger attending it, its greater efficacy, and the absence of any external cicatrix. Pozzi does not deny that cases of pelvic suppuration may be cured according to Péan's method, but he does not believe that adhesions can be broken up and foci of pus evacuated as well as when the abdomen is opened. While it must be admitted that removal of the adnexa sometimes fails to cause atrophy of the uterus, as shown by the persistence of hemorrhage, the latter symptom can usually be removed by the curette, without the necessity of total extirpation.

The greater mortality of vaginal hysterectomy as compared with abdominal section, is shown by the published statistics of the two operations. In the former operation there is no opportunity to correct errors in diagnosis by an explorative incision, hence it is not a procedure to be generally recommended.

[It seems incredible to the English reader that the learned author, whom we now recognize as the representative of French gynecological surgery, should be compelled to bring forward so many arguments against a method which reflects little credit upon the humanity of the profession. No man in this country, however great his reputation, could report a case of total extirpation of the uterus for pyosalpinx without evoking indignant protests. In spite of statistics, we can only regard this heroic treatment as a distinct retrogression on the part of our French *confrères*, more to be regretted because of its distinguished adherents.—Ed.]

Ventro-fixation of the Uterus without Opening the Peritoneal Cavity.

Crespi (*Gaz. degli Ospitali*, 1890, Nos. 20 and 22) has operated four times successfully by the following method: The patient is placed in the lithotomy posture with the hips elevated. A median abdominal incision is made, exposing the peritoneum. The uterus is then anteverted on a sound and is held in contact with the anterior abdominal wall, while several sutures are passed through the edges of the wound and into the muscular substance of the fundus.

Williams (*American Journal of Obstetrics*, 1890, No. 7) reports seven cases in which he adopted Kelly's suggestion of anteverting the uterus and passing two sutures of silkworm-gut through the abdominal wall and into the fundus by means of a large curved needle. The sutures were secured externally by

means of a silver plate, and were left *in situ* for three weeks. The displacement soon recurred in every instance.

KRUG (*N. Y. Medical Record*, 1891, No. 1) describes an ingenious operation which he calls "transperitoneal hysterorrhaphy," and has performed successfully several times. The patient being in Trendelenburg's posture, a sound is passed into the uterus and a catheter into the bladder. A median incision, not over two inches in length, is made just above the symphysis and the peritoneum is exposed. A Peaslee needle with a cutting point is then introduced at the left border of the wound, and with its edge the serous covering over the fundus uteri is scraped so as to leave a raw surface. The needle is then withdrawn slightly, is passed into the muscular substance of the uterus beneath the raw surface, emerges at the right edge of the abdominal wall, is threaded with silkworm-gut and withdrawn. Two sutures are sufficient to at once close the wound and to firmly attach the uterus in a position of anteversion. The entire operation should not occupy ten minutes, and can be supplemented by a perineorrhaphy if desired. The sutures remain for from four to six weeks. The writer affirms that with the patient in Trendelenburg's posture the intestines gravitate toward the diaphragm, so that it is impossible for them to receive injury. The catheter in the bladder indicates accurately the position of that viscus.

THE MECHANICAL CAUSES OF TORSION OF THE PEDICLE IN OVARIAN CYSTS.

CARIO (*Centralblatt für Gynäkologie*, 1891, No. 18) believes that the torsion may begin in consequence of a sudden muscular effort, as in lifting a weight during deep inspiration. The intestines are forced downward behind the tumor, and if they impinge on one side of it more than on the other, a partial revolution of the cyst occurs toward the side on which is the least pressure. Usually the resistance of the pedicle causes it to untwist and resume its former position after the pressure is removed, but if it is turned beyond 180 degrees further, torsion readily occurs.

THE ETIOLOGY OF VESICO-VAGINAL FISTULA.

WINTERHALTER (*Centralblatt für Gynäkologie*, 1891, No. 18) has collected 226 cases of vesico-vaginal fistula following labor, an analysis of which yields the following facts: 18.1 per cent. occurred in spontaneous, 81.8 per cent. instrumental deliveries. In 68.1 per cent. the forceps were employed, showing that their use is not unattended by danger. In the majority of the cases the pelvis was contracted. The writer advises craniotomy in preference to the forceps in cases in which impaction of the head is accompanied with œdema of the anterior lip of the cervix and of the external genitals, since under these circumstances 88.7 per cent. of the children are born dead. In a few cases the fistulæ were caused by pessaries.

GONOCOCCI IN AN OVARIAN ABSCESS.

ZWEIFEL (*Centralblatt für Gynäkologie*, 1891, No. 20) calls attention to the frequent coexistence of ovarian abscess and gonorrhœal pyosalpinx, though

the fact of a common origin has never been proved. He has recently demonstrated beyond doubt the presence of gonococci in the contents of a Graafian vesicle, situated in the centre of a suppurating ovary. This important fact shows that the cocci possess a greater migratory power than has been supposed, that they are not confined to mucous surfaces, but under certain unknown conditions may be carried through the blood- and lymph-vessels to distant parts. This agrees with Bumm's experience in finding the cocci in peri-urethral abscesses and in the knee-joint in cases of gonorrhœal rheumatism.

Forcipressure in Abdominal Surgery.

Kocks (*Sammlung klin. Vorträge*, 1891, No. 21) claims the following advantages for the forceps: 1. If proper instruments are used, there is no surer way of controlling hemorrhage from the broad ligaments than by forci-pressure. 2. The operation is shortened, hence the patient has less shock and less danger of septic infection. 3. The technique is greatly simplified, which is always of advantage to the operator. 4. Parenchymatous oozing is eliminated, and with it the danger of subsequent septic infection through the bleeding surface. 5. Clamps are easily rendered aseptic, while perfect asepsis cannot so readily be assured with silk and animal ligatures. 6. As the forceps are removed at the end of twenty-four hours, the abdominal cavity then remains free from any foreign body, hence there is no danger of suppuration or persistent irritation from the presence of ligatures. 7. Thorough drainage is insured.

Salpingo-oöphorectomy.

Zweifel (*Archiv für Gynäkologie*, Bd. xxxix. Heft 3) reports 77 cases of salpingo-oöphorectomy with a single death, statistics as yet unsurpassed by any other operator. He notes several interesting clinical facts, viz.: The majority of the cases of pyosalpinx were clearly of gonorrhœal origin; the accompanying localized peritonitis probably results from mixed infection rather than from pure specific poison. Many patients with pyosalpinx suffer from catarrh of the large intestine of a peculiarly obstinate character, which may be due to specific infection, although this has never been demonstrated bacteriologically. The different bacteria which may cause pyosalpinx are gonococci, streptococci, and tubercle bacilli. The occurrence of an evening rise of temperature in a well-marked case of pyosalpinx is an important diagnostic point in tuberculous salpingitis. Salpingostomy, or simple drainage of the tube without extirpation, should not be practised if pus is present.

As regards the ultimate effect of removal of the adnexa, the writer states that where the ovaries were entirely removed menstruation ceased; when it persisted it was in cases in which, on account of adhesions, a portion of the stroma probably remained. The majority of the patients reported that there was no change in their sexual feelings; a few complained that these were extinguished. The psychoses, so often described, were observed in only one instance.

Closure of Cervico-vesico-vaginal Fistula from the Side of the Bladder.

Baumm (*Archiv für Gynäkologie*, Bd. xxxix. Heft 3) reports an interesting case in which he followed Trendelenburg's suggestion to close complicated fistulæ by exposing and incising the bladder, as in epicystotomy, and suturing the edges of the fistula from within. The patient had had extensive sloughing after a tedious labor, as a result of which there was a large cervico-vesical fistula with extensive cicatrization involving the entire vaginal fornix, so that it was impossible to expect a successful result from a plastic operation. The patient was placed in Trendelenburg's posture. A median incision was made just above the symphysis, the pre-vesical space was exposed, and the bladder was opened by a transverse incision two inches and a half in extent, through which the interior of the viscus could be thoroughly inspected. The mouths of the ureters were surrounded by the cicatricial tissue at the edge of the fistula, but were located by passing a probe into them. The borders of the fistula were denuded, an assistant aiding by making pressure upon them *per vaginam*. Eight silk sutures (having a needle on each end) were passed down into the vagina, where they were drawn through by the left hand of the operator, and subsequently tied with the aid of a Simon's speculum. The upper wound in the bladder was closed with a double row of sutures, muscular and sero-serous, a T-shaped drainage-tube being inserted. After tamponing the pre-vesical space with iodoform gauze, the abdominal wound was closed. The patient had a tedious convalescence, and six weeks after the operation there remained a large fistula at the site of the abdominal wound which never closed. It was necessary to perform a slight secondary operation in order to completely close a small cervico-vesical fistula.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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The Action of Common Salt on Pathogenic Organisms.

This question, which, apart from its more purely scientific aspect, has a very practical interest in its bearing on the extent to which the salting or "pickling" of pork and other provisions may be relied on for the destruction of the germs of disease, was taken up about a year ago by Dr. C. J. Freytag at the instance of Professor Förster. It is well known that salt serves to preserve meat—*i. e.*, to prevent its spontaneous putrefaction, by abstracting water from the tissues and coagulating the albumin, though solutions of 10 per cent. dissolve out a portion of the myosin, which, together with the potash, salt, and extractives, may be recovered from the brine. But the question to be decided was whether it would destroy the vitality of microbes, as it cer-

tainly does that of parasites higher in the scale of animal life—in fact, whether it could be looked on as a disinfectant as well as a preservative. The ancient Greeks, as Dr. Anagnostakis has reminded us, employed solutions of salt as lotions in the treatment of wounds, and A. Seibert has recommended it for the local treatment of diphtheria. But R. Koch and Baumgarten had been surprised at the little or comparatively no effect of several substances, of which salt was one, commonly supposed to exert a destructive action on low forms of life; and Mertens had been equally disappointed in his experiments on the cocci of pus. These casual researches had, however, been conducted without adequate precautions, and Dr. Freytag determined to carry out his investigation exhaustively, beginning with the pathogenic bacteria of diseases proper to domestic animals, but possibly communicable to man in the consumption of their flesh. He made use not only of pure cultures of the bacteria, but of the tissues of diseased animals—*e. g.*, the tubercular nodules found in the bodies of cattle suffering from "Perlsucht." To imitate the conditions presented by the process of pickling, he used so much salt that a portion always remained undissolved; in gelatin cultures this had the effect of liquefying the medium, when the bacteria and the undissolved particles of salt sank to the bottom of the tube, but with those in agar the colonies were simply covered by the finely-powdered salt.

At regular intervals of time fresh sowings were made from the salted cultures, and animals, kept in clean and airy cages, were inoculated from each. He insists on the fact that for many years no case of natural tuberculosis had occurred among the guinea-pigs, and only a couple of cases, more than two years ago, among the rabbits kept in the laboratory for experimental purposes.

The results in each disease were as follows:

Anthrax. The spores, raised on sliced potatoes, were, as Koch had already shown, in no way affected by continuous exposure to the action of concentrated solution of salt for six months. Not so the vegetative forms, which were invariably killed after two hours' steeping of the organs containing them in a concentrated solution. Although even a saturated solution failed to kill the spores, the limits under which their germination and further development were possible were presented by solutions of 7 per cent. to 10 per cent. of salt in Löffler's bouillon.

Typhoid. Koch-Ebert's bacilli, obtained from the spleen of a man who had died from enteric fever, and grown on sliced potato and on Koch's gelatin, retained their vitality and power of development in fresh media after six months' exposure to a concentrated solution of salt.

Rothlauf, or "pig scarlatina." These bacilli, provided by Pasteur, remained unaffected after two months.

Cholera. Koch's comma-bacillus. The growth of these was luxuriant, liquefying the entire mass of the gelatin; and the salt, when added in excess, was deposited. Sowings made from these tubes after four, six, twelve, and twenty-four hours were all alike without result. Another series of experiments showed that eight hours' exposure to a saturated solution was invariably fatal to these bacilli, and that the highest concentration in which they could live was 7 per cent, but that 5 per cent. (not 2 per cent., as Uffelmann had asserted), was required to check their growth in any perceptible degree.

Erysipelas. No effect was produced on the cocci of this disease by an exposure to a saturated solution for two and a half months.

Staphylococci of pus resisted a like solution for five months.

Diphtheria. The Klebs-Löffler bacillus in pure cultures made from a virulent and fatal case were unaffected after three weeks in a saturated solution.

Tubercle. Portions of the organs of a guinea-pig that had died of tubercular peritonitis, and the sputa of the same animal, were, after two or three weeks' exposure to a concentrated solution, inoculated into the abdomen of a healthy guinea-pig, which died of tuberculosis a month later. But lest this one might have been infected by the diffusion in the air of the room of the dried sputa of the other, Dr. Freytag made a fresh series of experiments precluding such an accidental source of fallacy, and found that gelatin cultures of the bacillus were not injuriously affected by the action of concentrated solutions for three months.

Nodules of "Perlsucht," after eighteen days' immersion in brine, were used for the inoculation of rabbits with invariable success; in fact, three months' steeping, a far longer period than is ever employed in pickling meat for human food, in no way lessened the infective power of the bacilli.

Galtier's experiments, which gave a different result, were made with the expressed juices, not with the organs or tissues themselves.

In conclusion, Dr. Freytag observes that though it might be urged that, the bacilli of anthrax being killed and the toxines assumed to be dissolved out into the brine, such flesh, if free from spores, might be eaten with safety, it would be in practice impossible to ascertain or to guarantee the absence of the spores.

The question of tuberculosis is, however, of greater practical importance, on account of the frequency of the disease and the fact that much meat from animals suffering from it in different degrees finds its way into the market.

Since boiling alone suffices to kill the bacilli—*i. e.*, provided the interior of the meat be raised to that temperature—the previous pickling, as suggested by the authorities at Lyons, is superfluous, and, indeed, by inducing a false security, would be worse than useless.

These experiments possess a peculiar interest for a country where the pickling of meats constitutes an important industry.—FREYTAG, *Zeitschr. f. Hygiene*, 1890.

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